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TAYLOR (A. W.). *Glossina palpalis* **and Sleeping Sickness at Ganawuri, Plateau Province, Northern Nigeria.**—*Bull. Entom. Res.* 1930. Oct. Vol. 21. Pt. 3. pp. 333–340. With 1 map in text & 12 figs. on 3 plates. [2 refs.]

This is an admirable account of a recent epidemic of sleeping-sickness in the Ganawuri villages of the Bauchi plateau in N. Nigeria. The existence of the infection among the pagan tribes of the plateau has been discovered only in recent years, but *G. palpalis* is present, to some extent, in places where heavy shade and the requisite food supply are concurrent. The situation and climate, the natural water supply, the distribution of forest, the population and its pursuits, the local distribution of the fly and its high infection-rate (as determined by dissection of about 300 flies) are all pictured and are brought to a focus in the appended summary. Radical measures for breaking "the existing tsetse-man contact" were difficult. Since the cost of preventive clearing would have been prohibitive, even had labour been at hand, and even if the pious concern of the pagans for their sacred groves could have been ignored, the only alternative was to remove the entire population of the infected hill-villages to the tsetse-free river-plain at a convenient distance below. To this alternative measure the village headmen were gently persuaded in the end.

The following is from the author's own summary :—

"The absence of game and aquatic reptiles, the normal buffers between *G. palpalis* and man, has resulted in the fly obtaining a large proportion of its food from man. There is also in the district localisation of shade suitable to *G. palpalis* in, and in the very near vicinity of, the Ganawuri villages. The combination of these two factors has produced an extraordinary degree of intimacy of contact between tsetse and man, and the introduction of a virulent strain of *T. gambiense*, probably from Jemaa, has resulted in the present severe epidemic. Transmission of the disease is by cyclically infected *G. palpalis*, and the high infection rate in the fly makes up for its low rate of abundance."

A. A.

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LESTER (H. M. O.). **Report of Tsetse Investigation, 1929.**—*Ann. Med. & San. Rep. Nigeria*, 1929. Appendix B. pp. 31–49.

The report deals with experimental clearings of forest, experimental infection of tsetse and other flies, the adhesion test applied to cattle, and the Ganawuri sleeping sickness epidemic. The clearings at Sherifuri over a tract of nearly 72 square miles and the banks of sixty miles of meandering water courses, although not without effect on the fly (*G. morsitans* and *tachinoides*), are not sufficiently striking to justify their extension so long as they are not being occupied by settlers; they are, however, to be maintained. Those around the Matyoro Lakes, 6½ miles in extent, have been considerably settled and are "more prosperous." The chief anxiety here is recuperation of palustrine fig, regrowth of which starts from bits of twig or even from chips of bark; this is being countered by raising the level of the water of the marshes a few feet. Clearing by delayed burning at Sherifuri has certainly thinned *G. morsitans* there for the present, but after four years' experience is to be discontinued, since results do not justify expense.

Study of factors influencing the trypanosome infection-rate in tsetse-flies is described in some detail. In transmission experiments where 355 laboratory bred *G. tachinoides* were fed on a single laboratory strain of *T. brucei* 1·1 per cent. of flies became infected, and where 277 were fed on two strains of *T. brucei* 7·9 per cent. became infected. The difference in the rate in the two series is shown to be due not to temperature; it is suggested that it might be due to mixing of strains of the trypanosome, or to varying nutrition of flies after the infective feed, or to variation in the degree of concurrent bacterial growth in the gut of the flies [see TAYLOR & LESTER, *ante*, p. 368]. Studies of the direct mechanical transmission of *T. brucei* and *T. gambiense* by *G. tachinoides* are described [see TAYLOR, *ante*, p. 367].

In the application of the adhesion test to demonstrate chronic trypanosomiasis in Fulani cattle (taken at random from the herds) of 503 beasts tested against *T. brucei* 9 were positive, and of 503 tested against *T. congolense* 86 were positive. In the case of Pagan cattle, of 125 beasts tested against *T. brucei* 11 were positive, a rate (8·8 per cent.) that approximates to that of wild game in the district.

The work of Divisional Sleeping-Sickness officers is briefly abstracted, and the Ganawuri epidemic—which has already been noticed—is shortly described.

A. A.

NASH (T. A. M.). **A Contribution to our Knowledge of the Bionomics of *Glossina morsitans*.**—*Bull. Entom. Res.* 1930. July. Vol. 21. Pt. 2. pp. 201–256. With 8 text figs. & 1 coloured folding map. [5 refs.]

The author is in charge of the Kikori Entomological Station, Tanganyika Territory, lying in the densest part of the Kondoa eastern tsetse-fly belt, west of the Masai steppe. Kikori is an excellent locality for studying the bionomy of *Glossina morsitans*—the fly is abundant, game is plentiful, and in a small compass the "type" of vegetation ranges from hill forest to open grassy plain. In this report are described: (1) the local environment of the fly—main types of soil, climate and seasons, vegetation communes, game-distribution; (2) the methods and results of survey by "fly-rounds"; and (3) certain

studies in the insectary, field, and laboratory—the last being to gain some knowledge of the relative importance of the eyes and antennae of Glossina. A " fly-round," it should be explained, is not the volatile affair that the name suggests ; it is a very careful study of the fly in its environment, made at short intervals throughout the year, along a fixed route, the several routes being fixed so as to tap all the main " types " of the local vegetation. The following is the author's concept of a Fly " Community " (*G. morsitans*) based upon the surveys and studies here described in full detail :—

" The true habitats of the fly coincide with the major breeding sites ; they are characterised by perennial, if variable, shade and poor visibility. In the Eastern Kondoa Fly Belt, the *Berlinia-Brachystegia* wooding and small thickets form such habitats.

" Fly multiply during the favourable season that follows the rains. When the sky is cloudy, and even the savannah shrubs are green and umbrageous, tsetse are scattered throughout the bush.

" Fly are scarce during the unfavourable dry season. They concentrate within their true habitats, when the open country is leafless. The *Berlinia-Brachystegia* woods are considered to be the centres from which the fly advance or to which they retreat, according to the season.

" The open ' mbugas ' are the feeding grounds for both sexes of fly. At no season do they form a habitat. Hungry fly leave the shade of the woods and rove through the open ' mbuga ' searching for game ; the good visibility of such country is well suited to insects which appear to hunt by sight.

" It is believed that tsetse do not fly through the bush until attracted by a moving object, but that they definitely hunt, following paths and visiting recent haunts of game. Having fed, the fly make for the nearest stand of shady woods and there digest. There is no indication that fly return to the same habitat after each meal. Should there be no open country, then a road may form a feeding ground. These areas can be recognised by the relatively high female percentage and the starved condition of the fly. The tsetse taken in the true habitats have a very low female percentage and are well fed. These woods, however, are not considered to be male areas. Females are believed to be as abundant as males within the true habitat ; however, they are inactive between meals, and usually only fly when hungry and in need of food.

" Males are considered to be attracted by movement alone, whereas females need this tropism, as well as that of hunger. This reluctance on the part of the females is considered to be engendered by their fear of assaults from males. It is a common sight to see a female attacked by several males, which will grapple and force her to the ground, where the fight for possession may last for some seconds. In very dense fly, such as is usually found in the true habitats, a female may be attacked by as many as five individuals of the opposite sex. In belts of thin fly the female inactivity is not nearly so marked.

" *G. morsitans* is sometimes found in exceptionally large numbers in certain woods. A particularly suitable environment may attract many individuals until an aggregation is formed ; however, no evidence can be found to show that such a community is of a social nature."

A. A.

JACKSON (C. H. N.). **Contributions to the Bionomics of** *Glossina morsitans.*—*Bull. Entom. Res.* 1930. Dec. Vol. 21. Pt. 4. pp. 491–527. With 4 text figs. (1 map). [10 refs.]

The author recounts, in a circumstantial detail that is occasionally perhaps a little overcharged, his ideas and procedure in investigating

the country roundabout Sambala (in Tanganyika Territory) infested with *Glossina morsitans*. Having realized with a veteran conviction that the naturalist's first step in studying the biology of a particular species is to get an enlightened knowledge of its environment throughout the seasons, and that this is only acquired gradually by regular and repeated perambulations, he has mapped his field of observation in plots for periodic traverse, the plots being characterized severally by some obvious natural feature—type of forest, attractiveness for game, game-tracks, waterholes, etc. By this continuous method he has not only studied the topographical distribution, movements, and seasonal variation in numbers and condition of the fly, but also has collected and systematized a large amount of information about the physical features, the flora, the fauna, and the movements and habits of the large game of its environment. In his analysis of the fly-people (*G. morsitans*) the author distinguishes: (*a*) "female centres," anigh waterholes and well-beaten game-tracks, characterized by high percentage of female and a relative abundance of young (unfed) flies; a more or less steady stream of flies to these centres has been observed; (*b*) larger "male areas," commonly spread over large tracts of Berlinia-Brachystegia forest, where the percentage of females is "appreciably lower"—"this sex being practically absent except towards the end of the dry season"—and young (unfed) flies are scarce; (*c*) "spread centres" of still larger extent, with "apparently dense fly and high female percentage"; (*d*) "scarce-fly areas" at the limits of the range. "Investigation by field experiments and other methods has led to the conclusion that the 'female centres' and 'spread centres' are most probably feeding-grounds of fly, and that the 'male areas' are its home."

A. A.

Jack (R. W.). **Some Aspects of the Tsetse Fly Problem in a Colony developing on the Basis of European Settlement.**—*Pan-African Agric. & Vet. Conference, Pretoria, 1–17 Aug., 1929* (*Papers Vet. Sect.*). pp. 16–22.

During the last century tsetse-fly (chiefly *morsitans*) disappeared from the southern part of the colony (S. Rhodesia) and became scarce in the northern part; during the past 30 years, however, it has been steadily re-invading the northern area, where it now occupies fully 18,000 square miles of country, and is continuing to spread southwards on a front of more than 600 miles. The present paper is a reasoned argument on the question of how this impending menace to the southern country is to be faced. The most urgent aspects at present are to save from evacuation certain areas in European occupation that are already affected by the fly, and to prevent invasion of Native Reserves. Destruction of essential retreats of the fly is not generally applicable; moreover, reluctance to destroying shade is frequently expressed. The effect of clearing forest is insignificant; moreover, it is the protection of agricultural settlements that is the pressing need. About the effect of reduction of game, however, there is local unanimity; the effect may be slow, but it is perceptible. The immediate policy in Southern Rhodesia to-day, therefore, is to concentrate "on reducing the game as much as possible all along the edge of the fly-infested country"; to create and maintain game-free zones ten miles or more wide beyond the farm boundaries; and to control motor traffic of hunters and pros-

pectors. Entomological and biological research must, of course, be more facilitated than it has been hitherto.

A. A.

JACK (Rupert W.). **Tsetse Fly : Traffic Control.**—*Rhodesia Agric. Jl.* 1930. May. Vol. 27. No. 5. pp. 493–501. With 3 figs. on 1 plate.

This deals with the working of the Act for checking the spread of tsetse fly (*G. morsitans*) along lines of traffic in Rhodesia. There are two lines where fly-country is close enough to settled land to make the risk from transported flies a danger to graziers. The fly (both sexes) has a tendency to follow moving objects and to settle on the backs of pedestrians and cyclists and under the hoods of motor-cars. On pedestrians it may be carried perhaps as far as 10 miles, and on speeding motor-cars perhaps as far as 50 miles. When the moving object stops the flies move off and seek shade near by.

Any attempt to control pedestrians is considered to be impracticable, but vehicles (including cycles) leaving fly areas are restricted to fixed routes. Here at the points of exit there is a notice stating that motorists and cyclists are required to submit to certain prescribed measures, applied by the native police guard. Alongside the exit-gate is a hut for fumigating the vehicle, with at one end a mosquito-gauze anteroom for clearing the occupants of the vehicle of fly. On reaching the exit-gate the vehicle is passed through that end into the hut, the passengers alighting in the anteroom, where they are groomed with insect-nets while the vehicle is being fumigated in the hut itself, and also searched for skulking flies with insect-nets. Fumigation with wood-smoke has been found unsatisfactory, sulphur, of course, is out of the question, and in the circumstances CS_2 and HCN are unsafe; therefore in the present experimental stage " flit " and " komo " are being used. When all is done and the guard is satisfied that all transported flies have been destroyed, the vehicle is passed out of the fly area through the far end of the hut. Native cyclists are cleared of fly in special gauze cages.

A. A.

JACK (Rupert W.). **Pan-African Agricultural and Veterinary Conference, Pretoria, August, 1929. Discussions concerning Game Preservation, Trypanosomiasis and Tsetse Fly.**—*Rhodesia Agric. Jl.* 1930. Aug. Vol. 27. No. 8. pp. 827–840.

The preoccupation here is chiefly animal trypanosomiasis. The Conference allowed that existing species of mammals should be specially preserved, but resolved unanimously that no such preservation should be permitted in settled tracts where tsetse-flies are a constant menace to stock. In the ensuing discussion MARSHALL dissented from block clearance of forest, but thought that the making of " island " clearings in a fly-infested forest might be effective. He, as well as SMITH and MACDONALD, emphasized the importance of control of motor traffic from fly-belts, the last speaker stating " that he had seen vehicles bearing literally hundreds of flies a distance of sixty miles from the nearest defined belt." CARMICHAEL reminded members of the possible transmission of trypanosomiasis by other sanguisugous flies in tracts free from tsetse. Jack drew attention to two important points, namely

the great expense of big clearing for settlement, and the fact that at present the colony was most concerned with checking the continuous encroach of the fly on already settled areas—" the fly is quite capable of over-running an additional ten miles or more of the country on a broad front in a single year if conditions are sufficiently favourable."

A. A.

HARRIS (R. H. T. P.). **Report on the Bionomics of the Tsetse Fly (*Glossina Pallidipes* Aust.) and a Preliminary Report on a New Method of Control, presented to the Provincial Administration of Natal.**—75 pp. f'cap. With 15 illustrations. 1930. June. Pietermaritzburg : Natal Witness Ltd., Printers.

This document is of two parts : the first relates to the control of *Glossina pallidipes* in Zululand, the second is a long report mainly on the bionomy of that insect. In the first part the author states, of the particular tracts in consideration, that the invasion of its settlements by the fly is primarily due to unrestricted increase of large animals in neighbouring game-reserves in fly-infested country and the consequent spread of the surplus game (carrying the fly with it) towards the settlements. If selection were made among animal-species thought worthy of special protection by the State, and the less worthy sorts, such as zebra and wildebeest, were excluded, the select residue, freed from competition, would be unlikely to stray beyond their bounds in the fly zone. The comparatively slow rate of increase of the fly is the next point. Systematic and persistent persecution of such slow-breeding females might be expected to subdue the species. The author has already reported (see this *Bulletin*, Vol. 21, p. 435) how *G. pallidipes* is attracted to large animals and to decoys or dummy animals, and in his early attempts to destroy the fly on a large scale he used oil poisoned with pyrethrum, or veratrin, or delphinin, smeared on cattle and decoys. But although flies were killed by this method the poison was rubbed off as the grazing cattle wandered in high grass, and in any case did not retain its virulence after 48 hours exposure. Poisons not succeeding, the author's thoughts turned towards large-scale trapping, as is noticed in the second part of this paper. In the traps latest devised, he seems to have discovered a promising method of checking the increase of *Glossina pallidipes*. In the course of 24 days trial 2,997 fly—2,516 female and 481 male—were taken in a single trap. The daily catch of course depends on weather ; 1,326 of the above total were taken in five fine days ; in three foul days only 6 were caught.

The second part of the paper, on the bionomy of *Glossina pallidipes*, contains a good deal of matter that has already been summarized in this *Bulletin* (see Vol. 21, p. 435, Vol. 24, p. 892, and Vol. 25, p. 828) and now need not be repeated. Here the author tells at great length how the idea of trapping the fly originated in observation that the hungry insect (as well as some other bloodsucking muscoids and some tabanids) in alighting on an animal always pitched on the animal's legs and belly. This was found also to be the case when a decoy or dummy was substituted as bait. The decoy might be of the rudest make, even with a large sheet of board covered with sackcloth and set up on edge about two feet above the ground on two sticks for legs in a good light—a mere adumbrative pretence of a large animal—the fly in guileless indifference to its other properties always pitched within 2 or 3 inches of its lower edge. Thus the author's earlier observation

that the insect goes for its victims by sight—or, rather, by some particular shadowy attraction—and then tests their food value with its proboscis, seemed to be confirmed, and led to a line of experiment with traps.

In his field-laboratory the author noticed among other things a chirruping noise made by the female immediately after birth of a larva; a high-pitch "call" note suddenly emitted by a fly and sometimes answered; that flies would test things with their proboscis without sucking, and showed no desire to feed on a stunned python, a large sphyngid caterpillar, a cane-rat, and a baboon; but would suck even poisoned fluids if served beneath absorbent paper or cloth. Of laboratory-bred flies the three oldest males lived 135, 91, and 83 days, and the three oldest females 163, 151, and 114 days. The largest number of larvae born to one mother was nine. The average term of gestation ranged from 9 to 12 days in January and February to 18 to 21 days between May and August. The average term of pupation ranged between 22 days in December and 66 days in June. Once when the temperature in the laboratory rose to 110° F. all the flies died.

In nature the fly keeps covert, unless attracted to objects in the open, within its range of vision; so, although it is not seen in the open country, it can travel far along a broken stretch of covert. Its breeding-places are among clumps of evergreen bushes, thickets, and evergreen undergrowth of shady trees—places where there usually is checkered shade, a light dry friable soil, an adjacent game-track, and some amount of open aspect; they may be on banks of streams or not, or among rocks and boulders; usually the puparia are "just covered by the soil beneath the leaf-carpet."

The author has some remarks on clearing, firing, and fencing in Zululand. Clearing (see *Bulletin* Vol. 24, p. 892) for a width of 380 to 550 yards did not in his experience prevent the fly crossing an island of bush to which no large wild animals had had access for 2 years; but it, as well as fencing, may be useful near settlements, to keep out wild animals that attract the fly. Firing, although the spread of fire is hindered in rugged land, also is useful to keep down undergrowth in prospective resting and breeding places of the fly.

A. A.

HARRIS (R. H. T. P.). **Report on the Trapping of Tsetse Flies.**—8 pp. With 4 illustrations. 1930. Pietermaritzburg: The Natal Witness, Ltd.

The author reverts to his observations that *Glossina pallidipes*, being first roused towards prospective prey by sight and then directed to a definite line of shadow, assaults the ventral aspects (belly and legs) of a large animal, and after satiation returns promptly to the light; and he explains how these observations suggested the principles of a trap.

Imagine a shallow trunk, twice as long as wide, suspended lengthwise and vertically. Such an object with a little aid from art might ["so easy is a bush supposed a bear"] be an image or a simulacrum of a large animal. Imagine the sides of this suspended illusion to converge towards the mid-ventral line but (instead of meeting there) to remain slightly apart along their whole length, leaving a longitudinal mid-ventral slit; the simulacrum is now a trap—or, rather, the anteroom of a trap. The flies enter the anteroom, and in the attempt to escape

from it they make for the light, which is furnished by a cage attached to the dorsum of the simulacrum, with its mouth opening into the antechamber.

The trap can be mounted on two legs, or suspended. Its most attractive covering material is said to be hessian ; black material invites the flies, particularly the males, to rest on the outside ; khaki, if not fast dyed, fades ; white is no good. The traps, of course, must be set in places attractive both to large animals and to tsetse-flies. Since so much depends on clear shading they must not be set amongst foliage, but in a conspicuous place, where they cast their own shadow. The trap must be stood, or suspended, about 18 to 24 inches above the ground or above the top of long grass. Large catches, of course, are not to be expected in foul or windy weather—or from traps sheltered from the sun.

A. A.

Papert (J. L.). **Tsetse-Fly Survey of Zululand and Surrounding Territories.**—*16th Rep. of the Director of Veterinary Services and Animal Industry, Union of South Africa, Onderstepoort, Pretoria. 1930. Aug.* pp. 255–263. With 2 maps.

The subordinate staff in this survey consisted of six (afterwards increased to twelve) native " boys " familiar with the tsetse and its haunts and with the methods of tsetse-fly investigation. Donkeys and cattle were used as baits, and the procedure followed was to tether the animals in suspicious places, where the " boys " caught any flies that were attracted. The survey is reported in 10 sections, each dealing with a separate area in its topographical detail and with regard to its natural features, the occurrence of ngana, the presence of game, and the existence or propinquity of fly. Its interest is quite local.

A. A.

Hegh (E.). La lutte contre les tsé-tsés. Recherche des gîtes à pupes et destruction des pupes qu'ils contiennent. [**Wrestling with the Tsetse. Destruction of the Pupae in the Breeding-Grounds.**]—*Bull. Agric. Congo Belge.* 1930. June. Vol. 21. No. 2. pp. 405–411.

This paper sets forth in an infinity of detail a project for maintaining, around all the known foci of sleeping-sickness, a steady check upon *Glossina palpalis* by periodic destruction of pupae in places where the gravid flies deposit larvae. The plan is only *versus G. palpalis*, whose nurseries generally are restricted to dry crumbly soils near water ; it would be useless against *G. morsitans*, whose nurseries are so much wider scattered. [The proposal is not novel.]

A. A.

Bedford (H. W.). **The Distribution of Tsetse-Flies in the Sudan.**—*Bull. Entom. Res.* 1930. Oct. Vol. 21. Pt. 3. pp. 413–415. With 5 plates (maps). [8 refs.]

This paper records the discovery by Mr. T. D. Bayne of a tsetse-fly, authentically determined as *G. palpalis fuscipes*, in the Anglo-Egyptian Sudan. The few individuals seen were observed near Bilbibulo (Lat. 9° 58′ N., Long. 34° 06′ E.) on the north bank of the Khor Yabus, about 12 miles due west of the Abyssinian frontier and 4 miles west of Abongoro.

The Khor Yabus is here a perennial and well-shaded stream. Another locality suspected to harbour *G. morsitans* is the country north of the Yabus along the Sudan-Abyssinian frontier at least as far as Gallabat. A good feature of this paper are the five separate maps of the Anglo-Egyptian Sudan indicating severally the local distribution of the five species of tsetse-flies known to occur in the Sudan.

A. A.

GRAHAM-SMITH (G. S.). **The Oscinidae (Diptera) as Vectors of Conjunctivitis, and the Anatomy of their Mouth Parts.**—*Parasitology.* 1930. Oct. Vol. 22. No. 4. pp. 457–467. With 1 fig. & 1 chart in text & 9 figs. on 1 plate. [15 refs.]

Careful attention is here given to the small Muscoid flies—in particular those of the family Oscinidae—known in many parts of the world as "eye-flies" and "mango flies," and to a lot of recorded evidence incriminating them in the transmission of conjunctivitis and possibly other diseases. A detailed and well-illustrated account is given of the Oscinid proboscis, chiefly from *Hippelates pusio*, describing the six large pseudotracheae with the free ends of their serried chitinous rings splayed outwards and upwards to form as many double-edge saws capable of scarifying the surface of an abrasion or of the intact conjunctiva and so assisting the entrance of pathogenic microbes.

A. A.

DAVIES (W. Maldwyn). **The Control of Warble Flies in North Wales.**—*Jl. Min. Agric.* 1930. Dec. Vol. 37. No. 9. pp. 862–870. With 2 figs. on 1 plate. [7 refs.]

This paper, though meant for the veterinarian and farmer, may perhaps have some interest for the medical man. It celebrates the toxic powers of a "wash," or suspension, of powdered derris root for the subcutaneous maggots of warble flies. The wash consists of derris powder 1 lb. suspended in a solution of ¼ lb. of soft soap in a gallon of water. Several species of Derris (Deguelia) are said to be represented in the commercial root, but only three of them are said to be efficiently toxic and perhaps all of them are variable; the root therefore must be carefully selected. Its cost ranges from 2s. 3d. to 3s. 6d. per lb. The wash loses its virtue if kept longer than a day.

A. A.

PINTO (Cesar) & DA FONSECA (Flavio). Novos hospedadores intermediarios da *Dermatobia hominis* (L. Junior, 1781) "Diptera. Oestridae." [**Novel Intermediary Hosts of** *Dermatobia hominis*.]—*Rev. Med.-Cirurg. do Brasil.* 1930. July. Vol. 38. No. 7. pp. 248–250. With 1 plate. [Oswaldo Cruz Inst., Rio de Janeiro.]

The paper contains a fine enlarged photograph of a *Sarcophaga terminalis* with a packet of eggs of *Dermatobia hominis* attached to its abdomen, and a chronological record of the observed intermediary hosts of the eggs of Dermatobia. The list of these hosts includes a Culex, *Janthinosoma lutzii*, *Psorophora posticata*, *P. tovari*, and *Goeldia longipes*, besides several not identified mosquitoes; *Musca domestica*, *Stomoxys calcitrans*, Sarcophaga, and 7 other species of flies; and the tick *Amblyomma cajennse.*

A. A.

Laake (E. W.) & Cushing (E. C.). **Fly Trapping on the Ranges of the Southwest.**—*Jl. Econom. Entom.* 1930. Dec. Vol. 23. No. 6. pp. 966–972.

Report of a test of the value of trapping for screw-worm flies (*Cochliomyia macellaria*) on a stock-ranch in Texas. Traps at the rate of 1 to each 407 acres (about) were set over a typical ranch-area of about 200 square miles. Each trap was baited with 2 lb. fresh meat in 2 gallons water containing 8 cc. of nicotine sulphate (which aborts maggots without checking decomposition of meat). Flies were removed about every 6 weeks. In the course of about 33 weeks (March-November) 8,533 quarts of flies were thus removed. Among these flies (as determined from composite samples taken every 6 weeks from traps representing all parts of the area) more than 18 spp. were identified in the following percentage: *Cochliomyia macellaria*, 68·0 (64·3 per cent. female); *Phormia regina*, 16·8 (58 per cent. female); Sarcophaga, 7·4 (50 per cent. female); *Lucilia unicolor*, 6·2 (69·1 per cent. female); all other spp. 1·6 (females with 2 exceptions in enormous excess). The authors conclude that while organized fly-trapping gives promise of a distinct reduction in screw-worm, effective control can be brought about only in combination with destruction of carcases and with the help, possibly, of parasites and predators of the flies.

A. A.

Hase (A.). Ueber ein einfaches und billiges Verfahren, Fliegenmaden zu züchten. [**A Simple and Cheap Method of breeding Fly Larvae.**]—*Zool. Anz.* Leipzig. 1930. May 1. Vol. 88. No. 9–10. pp. 286–287. [Summarized in *Rev. Applied Entom.* 1930. July. Vol. 18. Ser. B. Pt. 7. p. 156.]

Rearing of larvae of *Calliphora vomitoria* and other flies in hard-boiled eggs. A small hole is made at one end of the egg, a little water and a small fragment of decaying meat is put into the hole, and the egg is stood in a shady place. The flies are attracted by the smell of the meat and lay their eggs in the hole, and the issuing larvae feed on the egg, remaining inside its shell. A few drops of water should be introduced occasionally, or the egg be kept in a damp atmosphere. On one egg 100 to 150 larvae may, it is said, be reared. If the egg be stood in moistened sawdust the larvae eventually will pupate in the sawdust.

A. A.

Brand (Alonzo F.). **Gastro-intestinal Myiasis. Report of a Case.**—*Arch. Intern. Med.* 1931. Jan. Vol. 47. No. 1. pp. 149–154. [3 refs.]

Case in a male infant of 15 months, a feeble rickety creature weighing but 19 lb. After 5 weeks' treatment for convulsions a fresh stool and a napkin were brought by the child's mother "alive with maggots" and also containing pupae; the maggots were identified as *Musca domestica*, the flies from the pupae as "*Stomoxys stabulans*" [? *Muscina stabulans*].

A. A.

Massias (Ch.). Myiases humaines en Indo-Chine. Deux cas de myiase génitale chez la femme. [**Myiasis in Indo-China. Two Cases of Female Genital Myiasis.**]—*Bull. Soc. Path. Exot.* 1930. June 11. Vol. 23. No. 6. pp. 595–596. [4 refs.]

Two cases of myiasis of the genitalia by *Chrysomyia bezziana*, in Annamite women. One was a young female with chronic gonococcal metritis, and

the maggots were tenacious in a foetid sore of the fourchette ; the other an old woman with a prolapsed abraded and foetid uterus, to the neck of which the maggots were attached. The author refers briefly to other cases of chrysomyiasis in Indo-China and elsewhere.

A. A.

Shrewsbury (J. F. D.). **A Case of Human Intestinal Myiasis.**—*Brit. Med. Jl.* 1930. Dec. 20. p. 1043. With 1 fig. on plate facing p. 1052. [1 ref.]

A case of mild enteritis in an English child. During its course 4 larvae of the common midge *Anisopus* (*Rhyphus*) *fenestralis* were passed at intervals.

A. A.

Webster (W. J.) & Chitre (G. D.). **Observations on Rat-Fleas and the Transmission of Plague. Part II.**—*Indian Jl. Med. Res.* 1930. July. Vol. 18. No. 1. pp. 337–345. [6 refs.]

These observations record the detail of a rat-flea survey of the city of Bombay for the year beginning March 1929, and the following is the authors' summary of the results : *X. cheopis* and *X. astia* were widely distributed, the former being five to twelve times more numerous on *Rattus rattus*. *X. brasiliensis* was practically confined to the most rural area studied. No marked seasonal variation was observed. Of 4,459 fleas identified 69·6 per cent. were *X. cheopis*, 27 per cent. *X. astia*, 3·3 per cent. *X. brasiliensis*, and 0·1 per cent. Ctenocephalides. The gross flea-index of rodents examined was *R. rattus*, 4·4 ; *R. norvegicus*, 6·9 ; Gunomys, 9·6 ; all three species of Xenopsylla were found on each of those hosts. The *cheopis* index was slightly higher for *norvegicus* than for *rattus*, and lowest for Gunomys. The *astia* index for *norvegicus* was five times greater and for Gunomys fourteen times greater than for *rattus*. The approximate percentages of females were—*cheopis*, 40 ; *astia*, 60 ; *brasiliensis*, 35.

A. A.

Webster (W. J.) & Chitre (G. D.). **Observations on Rat-Fleas and the Transmission of Plague. Part III** [Webster]. **Part IV** [Webster & Chitre].—*Indian Jl. Med. Res.* 1930. Oct. Vol. 18. No. 2. pp. 391–405. [11 refs.] ; pp. 407–425. [5 refs.] [Haffkine Inst., Parel, Bombay.]

The observations here recorded were made in Bombay.

The authors' brief summary of Part III states that all three rat-species of Xenopsylla—*X. cheopis*, *X. astia*, and *X. brasiliensis*—feed on man in the absence of a more suitable host—even at temperatures above 80° F. ; that no striking difference has been observed in the longevity of starved individuals of the three species ; that the developing stages of the fleas may survive temporary exposure (24 hours) to extreme temperatures of 98·4° F. and 40° F. ; and that in Bombay the hot weather is least favourable for *brasiliensis* and the cold season least suitable for *astia*, whilst *cheopis* thrives at all times.

To this may be added some items from the author's observations of the life-history. *Starved* fleas of all three species fed quite readily on man. Males took feeds more frequently than females. *X. cheopis* fed on man

laid many eggs, but none hatched ; no eggs were obtained from *X. astia* fed on man ; a single *X. brasiliensis* fed regularly on man produced at least 31 eggs several weeks afterwards, some of which hatched. In the hot weather starved *cheopis* and *astia* might live for a week, but the majority died in 2 to 4 days. *New-hatched* fleas, however, might live unfed for 2 to 3 weeks at a temperature above 80° F., and a few such lived for 3 or 4 days in a dry incubator at 98·4° F. Fleas kept in a saturated atmosphere at 40° F. appeared dead after 24 hours, but quickly revived when transferred to room temperature and could be re-frozen and revived again for several successive days. It does not appear that the term of survival of the starved flea can be an important factor in determining the comparative efficacy of different species as plague transmitters (in Bombay). Eggs hatched in 2 to 9 days—the majority in 4 to 5 days. No eggs hatched in the dry incubator at 98·4° F., or in the damp refrigerator at 40° F. The duration of the active instars of larvae was much the same in all three species. With much individual variation cocoons often were formed on the 18th to 20th day. The duration of the quiescent cocoon stage ranged between 7 and 16 days—about 10 days in April. Cocoons of *cheopis* and *astia* have lived in the incubator at 98·4° F. for three days, but not longer, and a stay of 24 hours at that temperature or at 40° F. did not affect subsequent development at room temperature. The whole term of development from egg to adult has varied from 19 to 66 days, with no conspicuous difference between the three species. Among effective natural enemies of pupae of fleas are book-lice (Psocidae), of eggs and adults are ants, and of adults are spiders.

The authors' conclusions of Part IV support the view that " the chief factor in the spread of plague which is under the influence of climatic changes in Bombay is connected with the blocking phenomenon." Within a rather limited range of temperature and humidity a much larger proportion of infected fleas became capable of transmitting the infection. For the progress of plague a higher *astia*-index is required than in the case of *cheopis* or *brasiliensis*.

" The relative efficiency of the three species has been found to be closer at higher temperatures than under the conditions which appear more suitable for epidemic plague. An increased proportion of *astia* might therefore tend to limit or exclude the epidemic period with a given gross flea-index. The two factors, climatic conditions and flea species, are both, therefore, important variants. The contradictory views which regard one of these factors as of prime importance, the other being negligible, need no longer be considered irreconcilable. Further study of individual infected fleas which are proved capable of transmitting the infection is considered important. It is obvious that in the majority of infected fleas the plague bacillus has entered a blind alley."

The authors describe their procedure in, and tabulate and discuss the results of, the long series of experiments upon which these important conclusions are based. In summary : both sexes of all three species of Xenopsylla parasitic on rats are capable of harbouring the plague bacillus, but the proportion of infected fleas that become capable of transmitting the infection is not large and depends upon climatic conditions. Assuming that blocking is the most effective factor in the transmission of infection, it seems that climatic influences must largely determine the proportion of infected fleas that become blocked and are fated to increase the spread of plague. As a matter of fact, December and January and February are much the most favourable months for experimental plague-transmission with *cheopis* and *brasiliensis* in Bombay city, and these are the cooler and less arid months which in years past were notorious for a great increase in the number of human cases of plague reported in Bombay. *X. brasiliensis* as a transmitter is at

least as efficient as *cheopis* ; *X. astia* is distinctly inferior to both, " not qualitatively but quantitatively. . . . Where it is almost the only rat-flea a high flea-index will be required if epizootic and epidemic plague is to continue." Although blocking has been observed in both sexes of *astia* and continuous transmission experiments have been successful with *astia* only, the authors have found male *astia* as of " low value " in transmission, and find that the proportion of infected astia that become capable transmitters of plague is much less than in the other two species. A summary hardly does justice to the large amount of careful and patient work reported in this paper.

A. A.

FAWCETT (Hugh A.). **Preliminary Rat-Flea Survey and Some Notes on its Relation to Local Plague, Hongkong.**—*Jl. Hygiene.* 1930. Nov. Vol. 30. No. 4. pp. 482–489.

This is a concise and careful paper and well worth reading in full. Incidentally it illustrates the worth of the old Horatian maxim :—

* " Quidquid praecipies, esto brevis, ut cito dicta
Percipiant animi dociles teneantque fideles :
Omne supervacuum pleno de pectore manat."

Hongkong is much infested with rats and mice ; 155,572 were destroyed in the year 1928. Most of them are brought in killed or " found dead " and decomposed ; very few indeed are fit for combing. From 442 live rats searched in the year 1929–30, 2,286 fleas were collected, 2,117 being *Xenopsylla cheopis* (not any *astia*), 163 *Leptopsylla musculi*, 3 Ctenocephalus, and 3 Pulex. The maximum number of fleas from a single rat was 67, all *cheopis* ; other heavy individual *cheopis* infestations ranged from 20 to 57, three of the highest (39 to 57) being from rats caught in a rice-store. The maximum *cheopis* index (8·5) occurred in May ; in June-August that index was over 7·0 ; in September, 5·2 ; in October and November, 3·5 ; in December-January, over 2·5 ; in February, 1·2 ; in March, 4·5 ; in April, over 5·0. It is pointed out that May, which has the highest *cheopis* index, has the highest rainfall and relative humidity of any month and a high mean temperature ; and that February with a very much less rainfall and a lower relative humidity, and the lowest mean temperature of any month in the year, is also the month with the lowest *cheopis* index ; and when these facts are compared with the human and rat plague statistics for the last ten years, it is seen that while far the largest number of cases of human-plague and rat-plague have fallen in May and the next largest in June, February is one of the months when human-plague is in marked retirement and rat-plague is dormant. April-July is the danger-season for Hongkong.

In the regional statistics of the city for the last decennium the districts showing the largest number of human cases of plague (319) and the highest *cheopis* index (6·6) include a densely peopled maritime area with narrow streets and some old houses, a large and constant sea-going

* Of which the following is an original and fairly accurate translation :—
Whate'er the preconceptions are—Be brief ;
So lively words apprise the willing brain
And there hold fast in confident belief ;
All surfeits from the sated bosom drain.
HORATI, *De Arte Poetica.*

trade carried in native craft, and a constant flux of floating population. It is at this floating insanitation in the midst of a busy coast-trade that the author points the warning finger for the renovation of plague (and other epidemics). The district where the figure for rat-plague is somewhat higher (24 as against 19) is also an area of narrow streets and many old tenements where a poor-class population has reached the quintessence of density; its *cheopis* index is high (5·8) and its figure for human plague is on the high side (156 as against 319); but it has not the particularly risky floating and coast-trade concentration. The measures that stand out in probable explanation of the comparative immunity from plague at present enjoyed by Hongkong are, house to house cleansing and whitewashing in all districts; removal of all superfluous woodwork and cavities in native houses; vigorous rat-killing.

A. A.

Patanè (Carmelo). La fauna murina di Bengasi ed i rispettivi pulicidi parassiti. Confronti col comportamento stagionale delle locali manifestazioni epidemiche di peste. [**Rats and their Fleas in Benghazi. A Comparison of their Seasonal Prevalence and Local Epidemics of Plague.**]—*Arch. Ital. Sci. Med. Colon.* 1930. Sept. 1. Vol. 11. No. 9. pp. 544–566. English summary (9 lines). [Inst. of Colonial Path., Univ., Bologna.]

Of the 2,700 rats examined during 1920–23 56 per cent. are said to be *M. alexandrinus*, 44 per cent. *M. rattus*; but since a considerable proportion are entered as "classifiable with difficulty," the figures are not of much value. The rat population is said to be higher in spring and summer. Of the associated fleas during two years—the average per rat being 3·5 in 1922, 4·2 in 1923—*Xenopsylla cheopis* and *Ctenopsylla musculi* constituted 97 per cent. of the total, the former slightly predominating; the residue were *Ceratophyllus fasciatus*, and *Ctenocephalus felis*, with an occasional *P. irritans* and *C. canis*. The returns of plague deaths for 6 years between 1914 and 1922 show the largest numbers in April-July; but except in 1917 and 1918 plague was not very prevalent, and in 1922 there were only 6 cases altogether, 34 in 1915, and 54 in 1921.

H. H. S.

Hicks (E. P.). **The Early Stages of the Jigger,** *Tunga penetrans*.—*Ann. Trop. Med. & Parasit.* 1930. Dec. 18. Vol. 24. No. 4. pp. 575–586. With 4 text figs. [16 refs.] [Sir Alfred Lewis Jones Research Lab., Freetown, Sierra Leone.]

After recounting some interesting historical facts in the dispersion of the adult jigger (*Tunga penetrans*) by shipping and by land and describing convenient methods of treatment and observation of its living larvae, the author gives an excellent and well-illustrated account of the larval anatomy, attention being directed to the following distinctive features: the existence of only two larval instars, the form of the egg-breaker, the form and number of mandibular teeth, the form of the maxillary palp, the processes of the labial palp, the four hooks on the ventral surface of the head, the form of the anal struts. The larva hatches on the 3rd–4th day, the first moult occurs on the 5th–8th day, preparation for pupation occurs on the 6th–17th day, the larva pupates on the 10th–18th day, the

imago emerges after the 17th day—in each stage dating from the laying of the egg.

A. A.

BUXTON (P. A.). **The Biology of a Blood-Sucking Bug,** *Rhodnius prolixus*.—Reprinted from *Trans. Entom. Soc. of London*. 1930. Dec. 31. Vol. 78. pp. 227–236. With 1 text fig. [8 refs.] [School of Hyg. & Trop. Med., London.]

The observations here recorded were made on a stock of *Rhodnius prolixus* that had been in captivity at least ten years.

The duration of the egg stage is "erratic," even of eggs laid by one female on the same day and kept at a constant temperature. It varies from 10 to 37 days, but the majority of eggs hatch between the 14th and 16th and between the 20th and 22nd days. There are five larval stages, the fifth and last moult occurring, in the author's experience, on the 99th day at a constant temperature of 24° C., and on the 72nd day at a constant temperature of 30° C. The larva generally feeds once in each instar; at its first feed it takes—in a few minutes—about twelve times its weight of blood, and even at the last stage about six times; the larval growth is "dramatic." The duration of *adult* life of three males was 156, 160, and 167 days, severally; of eight females 127, 133, 154, 169, 189 (twice), 203, and 207 days, severally. Fresh-emerged starved males (seven) lived between 30 and 60 days, and starved females (nine) between 30 and 40 days. Adults take relatively much less blood at a feed than larvae. The virgin female, if fed, lays eggs, which are barren. The male, however, even when deprived of his mouth-parts at his emergence, can produce fruitful spermatozoa. If female and male are cohabiting the first egg is laid on or about the thirteenth day of adult life. All the females observed by the author laid at least four batches of eggs; some laid more, but only one female produced as many as nine batches (URIBE is quoted as giving the total produce of a single female as 200–300). A single male could fertilize at least 7 females. Other interesting detail is recorded but is rather outside our scope.

A. A.

KATAGAI (Tatsuo). **Experimental Observations on the Life History and Bloodsucking Habits of** *Rhodnius prolixus* **from South America.**—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1930. Sept. No. 306. [In Japanese. With 18 figs. on 2 plates. English summary pp. 56–58.] [Govt. Research Inst., Formosa.]

The life of the captive bug *Rhodnius prolixus* is followed in overflowing detail. Breeding-season (in a Formosan laboratory) May-September. Number of oviposits by individual females during life ranged from 26 to 131, and total number of eggs laid by individuals ranged from 126 to 1,271. At room temperature incubation took from 11 to 16 days, and 59·46 per cent. of eggs hatched. Sucking blood at pleasure, larval existence ranged from 86 to 385 days, and adult life from 19 to 533 days. The insects were not dainty, and fed on nine kinds of domestic mammals, besides the monkey, rat, mouse, and the pigeon and hen; they could bear starvation withal, individuals in the third larval stage having fasted for 5 to 7 months.

A. A.

Saito (J.). Ueber hautreizenden Giftstoff eines japanischen Giftschmetterlings, *Euproctis flava* Bremer. [**On the Skin-Irritant Toxin of the Japanese Noxious Moth** *Euproctis flava* **Bremer.**]—*Japan. Jl. Dermat. & Urol.* 1930. Mar. Vol. 30. No. 3. pp. 230–243. With 2 text figs. [In Japanese. German summary pp. 29–30.] [Imperial Clinic for Dermat. & Syph., Univ., Sendai.]

Another contribution to the oft-discussed dermatitis caused by the nettle-hairs of the caterpillar of the moth *Euproctis flava*. Earlier writers thought that its causation was merely mechanical, but later writers demonstrated the presence of a toxic secretion. The present author confirms the existence of a toxin and describes its properties. [A good deal of general and particular information on this subject is to be found in papers summarized in this *Bulletin*, Vol. 19, pp. 843, 844; Vol. 20, pp. 472, 800; Vol. 21, p. 789; Vol. 22, pp. 913, 917; Vol. 23, pp. 295, 721; Vol. 24, pp. 400, 401, 894; Vol. 25, p. 287; Vol. 26, p. 277.]

A. A.

Pawlowsky (E. N.) & Stein (A. K.). Experimentelle Untersuchung ueber die Wirkung des Bisses von *Periplaneta orientalis* auf die Menschenhaut. [**Effect of the Bite of** *Periplaneta orientalis* **on the Human Skin.**]—*Arch. f. Dermat. u. Syph.* 1931. Vol. 162. No. 3. pp. 611–620. With 7 text figs. [16 refs.] [Military Med. Acad. & Inst. for Med. Science, Leningrad.]

This long story is illustrated by some very good and very familiar pictures of the individual mouth-parts and the salivary glands and reservoirs of the cockroach and of an enlarged vertical section of human skin through the excoriation of the epidermis caused by a cockroach.

A. A.

Nuttall (H. F.). Le rôle pathogène des tiques. [**Ticks as Pathogenous Agents.**]—*Bruxelles-Méd.* 1930. Oct. 12. Vol. 10. No. 50. pp. 1359–1366.

This is a masterly summary, critical and adequately historical, of existing knowledge of ticks in relation to disease, of the effects of their bite and the specific infections that they transmit, and of tick prophylaxis.

A. A.

Ruttledge (W.). **Notes on** *Argas brumpti* **(Acarina).**—*Bull. Entom. Res.* 1930. Oct. Vol. 21. Pt. 3. p. 273. [2 refs.]

Close observers have failed to discover the host of the larva of *Argas brumpti*. One observer found that it would attach itself to the skinny head and neck of guineafowl. The present author cannot find it there in nature, but in the Nuba Mountains he found the larvae plentifully adherent to the loose skin of the head and neck of the very common lizard *Agama colonorum*. This was in March; later in the year the lizards seemed free from tick larvae.

A. A.

Dios (R. L.) & Nopoff (R.). Les Ixodoïdés de la République argentine. [**Ticks of the Argentine Republic.**]—*C.R. Soc. Biol.* 1931. Feb. 13. Vol. 106. No. 5. pp. 393–394.

A list of 13 well-known species and the hosts from which they were taken.

A. A.

Des Essarts (J. Quérangal). Parasitisme accidentel du tube digestif par un acarien de la famille des tyroglyphinés le *Tyroglyphus farinae*. [**Accidental Parasitism of the Intestine by a Tyroglyphine Mite,** *Tyroglyphus farinae*.]—*Presse Méd.* 1930. Aug. 30. Vol. 38. No. 70. pp. 1176–1177.

In the course of nearly 1,000 examinations of faeces at the Brest Marine Hospital laboratory during the past year flour-mites (*Tyroglyphus farinae*) were found in the stools in 8 cases. In 7 of these cases there was diarrhoea and in one case gastritis with hepatic complications. In four cases there was a past history of dysentery, but in only two of these were amoebae or cysts found. Of the other four cases no protozoa were found in three, Lamblia in one (along with Trichocephalus eggs), and Trichocephalus eggs in one of the others. The author thinks it unlikely that the flour-mite was the actual cause of the diarrhoea, etc., in these cases, but not improbable that it might have aggravated it. He states that imports of grain and flour are often infested with the mite, and that men handling the infested stuff sometimes suffer from oculo-nasal catarrh, respiratory affections, and itchy vesiculous eruptions on the face, neck, and hands.

A. A.

André (Marc). Sur une larve d'acarien parasite de l'homme et des animaux en Uruguay, appartenant au genre *Thrombicula* Berlese. [**A Trombicula Larva Parasite of Man and Animals in Uruguay.**]—*Ann. Parasit. Humaine et Comparée*. 1930. July 1. Vol. 8. No. 3–4. pp. 355–361. With 3 text figs. [1 ref.]

Talice (R. V.). Sur la trombidiose humaine en Uruguay. [**Trombidiosis in Man in Uruguay.**]—*Ibid.* pp. 349–354. [13 refs.]

Both these papers relate to a new variety—*uruguayensis*—of *Trombicula irritans* Riley, the harvest-mite larva of Uruguay, which in that country, chiefly from December to March, is the cause of a distracting dermatitis similar to that caused in late summer in Europe by the larva of *Trombicula autumnalis*. André describes and figures the mite; Talice, while also noticing the mite, which he states is very similar to *Trombicula brumpti* Labille (1927), describes the well-known dermatitis.

A. A.

van Thiel (P. H.). *Trombicula flui* **n. sp., a Patatta-Mite ("Patatta-Luis") of Surinam.**—*Parasitology*. 1930. June. Vol. 22. No. 3. pp. 346–354. With 2 text figs. [13 refs.] [Inst. of Trop. Med., Univ., Leiden.]

The author comments on the *patata*-mite of Surinam named by Linnaeus *Acarus batatas* and on the facts that two other S. American mites, namely *Trombicula helleri* Oudemans and *T. irritans* Riley (=*T. tlazahuatl* Ewing) have been identified with the *patata*. He describes and figures as a new species, *T. flui*, caught on man in Surinam (and (larva) in some cases containing blood) and therefore supposed by him, since it is different from *T. helleri*, either to be the *patata*-mite described by Linnaeus or to signify that "*patata*-mite" is a collective term including two species *T. flui* and *T. helleri*. [The difficulty is not evaded so easily.]

A. A.

i. van Thiel (P. H.). De "Patatta-luis" uit Suriname, met aanteekeningen omtrent de aetiologie der Leishmaniosis americana. [**The "Patatta-Louse" of Surinam, with Notes on the Etiology of American Leishmaniosis.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1930. Jan. 1. Vol. 70. No. 1. pp. 47–63. With 2 text figs. [28 refs.] [Inst. for Trop. Med., Leyden.]

ii. Bonne (C.). Opmerkingen over de Patatta-luis en de Leishmaniosis americana in Suriname. [**Remarks on the Patatta-Louse and American Leishmaniosis in Surinam.**]—*Ibid.* Feb. 1. Vol. 70. No. 2. pp. 176–179. [1 ref.]

i. "Patatta-louse" is an undefined species. The author here suggests directions for further research on this subject (information about the mago, seasonal occurrence, biology and ecology). He discusses the possible pathogenic significance of the mites; the itch and scratching caused by their bite may play an indirect part in the etiology of ulcers of the leg, but as regards specific diseases (American leishmaniasis, tropical typhus) they probably do not act as vectors.

ii. The author, who knows the Patatta-louse by experience as a very annoying insect in Surinam, agrees with Van Thiel that it probably plays no part of any importance in epidemiology. As regards the American leishmaniasis, whatever the vector may be, he thinks that it does not transmit the virus direct from the patient; the sporadic spreading of forest yaws suggests the presence of a virus reservoir outside the human body.

W. J. Bais.

Brug (S. L.) & Haga (J.). **Notes on the Sarcoptes found in a Case of Scabies crustosa and in a Case of Scabies in a Monkey.**—*Meded. Dienst d. Volksgezondheid in Nederl.-Indië.* 1930. Vol. 19. Pt. 2. pp. 221–226. With 1 plate. [10 refs.]

The Sarcoptes from the monkey (whose owner had been treated for itch) are here pronounced to be identical with the Sarcoptes from a case of Norwegian itch in a Chinaman. The authors are inclined to agree with those who doubt the validity of the different "varieties" of *S. scabiei*.

A. A.

Miyajima (M.). **Twenty-five Years of Parasitology in Japan.**—*Japan Med. World.* 1930. Feb. 15. Vol. 10. No. 2. pp. 32–35. [1 ref.]

——. Vingt-cinq années de parasitologie au Japon.—*Bull. Soc. Path. Exot.* 1930. July 9. Vol. 23. No. 7. pp. 685–691. [1 ref.]

A review of Japanese contributions to parasitology. In 1904 Fujinama and Katsurada discovered *Schistosoma japonicum*; later Katsurada observed that cats and dogs could be infected with the parasite by immersion in ponds reputed to spread the disease; and in 1913 Miyairi and Suzuki discovered the intermediary pondsnail host and demonstrated the direct passage of the cercaria through the skin of the vertebrate host. In 1905 *Sparganum prolifer* was discovered by Katsurada. In 1910 Kobayashi discovered the second intermediary host of *Clonorchis sinensis* to be a cyprinoid fish, and in 1919 the first intermediary host was found by Muto to be a pondsnail. In 1915 Nakagawa showed that river-crabs and crayfish carried the encysted cercariae of *Paragonimus westermanii*; and in 1920 this same

observer had followed out the life-history of *Fasciolopsis buskii* [showing it to be exactly parallel with that of *Fasciola hepatica* as described by THOMAS in 1883]. More recently OKUMURA followed the oncosphere of *Dibothriocephalus mansoni* into a species of Cyclops wherein [as in the case of *D. latus* described by ROSEN and JANICKI in 1917] it pursues its development. KOINO's corroboration of STEWART's discovery of the life-history of *Ascaris lumbricoides* [which had already received manifold confirmation] is also mentioned.

Outside helminthology appreciation is due, and is here given to the constancy and value of Japanese work on spirochaetes and on tsutsugamushi infection.

It is to IJIMA's *Jintai-Kiseidobutsu-Hen* (Animal Parasites of Man), published in 1888, seconded by GOTO's *Ectoparasitic Trematodes of Japan* (1894), that Dr. Miyajima attributes the inception of Parasitology in Japan, although he also keeps in pious remembrance the " Japanese physicians who lived a hundred years ago."

A. A.

ZAVATTARI (Edoardo). Note di parassitologia Cirenaica. [**Note on the Parasitology of Cyrenaica.**]—Reprinted from *Bol. Soc. Ital. di Med. ed Igiene Colon.* Supplement to *Giorn. di Clin. Med.* 1930. No. 13. 11 pp. [1 ref.] [Inst. of Comparative Anat. & Physiol., Univ., Pavia.]

The author spent August and September 1929 exploring Cyrenaica, where infection by *S. haematobium* and by *S. mansoni* had been recorded. He found *Planorbis numidicus* and *Pl. atticus*, but none infected ; also *Bullinus contortus* in Derna and Atrun. Anopheles were very rare (an occasional *A. pseudopictus*) and malaria is absent. The true *Aedes argenteus* exists there without doubt ; also *Culex pipiens*. Phlebotomus is very rare, Culicoides fairly numerous, Simulium (*S. equinum* and *S. latipes*) abundant in the Derna region. *Stomoxys calcitrans* and several species of Hippobosca were met with. *Ornithodorus savignyi* was very abundant in the Gialo oasis, but not elsewhere.

H. H. S.

ISOTTI (Filippo). Considerazioni sui reperti degli esami di feci eseguiti dal 1 ottobre 1929 al 31 luglio 1930. [**Results of Faecal Examinations made between 1 October 1929 and 31 July 1930.**]—*Arch. Ital. Sci. Med. Colon.* 1930. Oct. 1. Vol. 11. No. 10. pp. 621–630. [20 refs.] English summary (4 lines). [Lab. of Colonial Path., Villa Torri, Bologna.]

During the ten months 608 specimens of faeces were examined at the Laboratory of Colonial Pathology, Bologna. 435 or 71 per cent. gave parasitic findings. *E. histolytica*, in cystic or vegetative form, was the commonest, being found 235 times (38·6 per cent.) ; Lamblia in 60 (9·8 per cent.) ; Trichomonas in 65 (10·7 per cent.) ; *E. coli* in 40 and *Chilomastix mesnili* in 22, the last nearly always associated with *E. histolytica*. *Blastocystis hominis* was found in 162 or 26·6 per cent. Helminthic parasites were not numerous ; ova of Trichuris were found in 25, of Ascaris in 13, of *A. duodenale* 2, of *Sch. mansoni* 1, *Oxyuris*

vermicularis 2. The patients were inhabitants of the district and "had not been in contact with persons from the tropics."

H. H. S.

Curran (J. A.) & Feng (S. T.). **A Survey of Human Parasites of West Central Shansi with a Note on Diphtheria.**—*China Med. Jl.* 1930. Sept. Vol. 44. No. 9. pp. 891–904. [3 refs.]

Results of a study of intestinal Protozoa in stools of 1,135 Chinese in West Shansi; 236 were examined six times, 628 once, 28 five times, 31 four times, 70 three times, 142 two times. (In the series examined six times 37 per cent. of *Entamoeba histolytica* were detected in one examination and 76 per cent. by three examinations.) The infestation of the whole, in corrected percentage, is as follows: *Endolimax nana*, 35·6; *Ent. histolytica*, 15·0; "*Councilmania lafleuri*," 3·4; *Ent. coli*, 47·7; *Iodamoeba buetschlii*, 19·0; *Giardia intestinalis*, 9·2; *Chilomastix mesnili*, 15·7; *Trichomonas hominis*, 11·1. The percentage of *E. histolytica* increased gradually from 6·8 between one to fifteen years to 23·7 above fifty years of age; it was higher among patients having disorders of the alimentary canal than in other patients. Infestation with Giardia was only slightly higher in children. Except in the case of Trichomonas, infestation was lighter in summer.

Examinations of 1,015 patients for intestinal Helminths showed the following percentage: *Ascaris lumbricoides*, 55·3; *Trichuris trichiura*, 0·7; *Oxyuris vermicularis*, 0·2; *Hymenolepis nana*, 0·3. No hookworm was found. Ova of *Dicrocoelium dendriticum* were found, from 26 patients.

Kala azar is not common. Occasional cases of benign tertian malaria occur. In the course of 18 months all cultures from throats with membranous exudate have been negative for the diphtheria bacillus.

A. A.

Faust (Ernest Carroll). **Animal Parasites of the Skin and its Adnexa.**—*Jl. Trop. Med. & Hyg.* 1931. Jan. 1. Vol. 34. No. 1. pp. 1–3. [Dept. of Trop. Med., Tulane Univ., New Orleans.]

This is an Address to the Louisiana Dermatological Society. Its sweep is unusually wide, since in addition to the well-known ectoparasites it includes "other invertebrates which produce lesions in the skin," also vertebrates—venomous snakes, amphibia, fishes, and even the duck-mole, *Ornithoryhnchus paradoxus*—and, at the other extreme, dermal infection by the dysentery amoeba.

A. A.

Nicolle (Charles). Pourquoi les méthodes des laboratoires de microbiologie ne peuvent pas être unifiées. [**Why the Methods of Microbiology Laboratories cannot be made Uniform.**]—*Presse Méd.* 1930. Aug. 20. Vol. 38. No. 67. pp. 1131–1134.

This is a reflective paper; a not untimely argument on the influence of officialdom in science; a discourse, with appropriate illustrations,

on the dangers that impede and threaten to extinguish free thought in science by too much official dictation and bureaucratic ritual. The author begins by rejoicing in the freedom of the French spirit, which glories in new ideas rather than in that pluri-perfection of technical apparatus which some people nowadays call "progress." He has nothing to say against mechanical arrangements that economize time and money, simplify work, and further the communication of ideas; but there must be no set limits to the range of inquisitive and creative thought. He is very warm on the subject of those central offices, conferences, and international congresses that demand from all Research Institutes universal conformity in the preparation of vaccines and serums, in laboratory usage and technique, and in the editing of publications; such strict adherence to set standards should be limited to statistical statements. As three illustrations (of the many that could be given) of the real progress that issues from diversity rather than from stolid routine the author reviews the existing varieties of practice in the preparation of antivariolous and antirabic vaccines and antidiphtheritic serum. For laboratories where analysis, diagnosis, etc., are carried on for private profit, and where, perhaps, penury of ideas and service may wait upon penury of equipment, the author, of course, insists on official inspection and State control; but in State Institutes the free intercourse and exchange of thought do not harmonize with a bureaucratic atmosphere.

A. A.

Kalandadse (Wl.) & Mtschedlidse (I.). Materialien zur Biologie der *Gambusia affinis*. [**Biology of** *Gambusia affinis*.]—*Nachrichten der tropischen Medizin*. Tiflis. 1930. May–June. Vol. 3. No. 1. pp. 23–40. [In Georgian script. German summary pp. 96–97.]

This is an account of the habits and behaviour of *Gambusia affinis*, a well-known bogy of the mosquito nursery, by observers in Tiflis, where it has been introduced recently; it may interest those who are not familiar with a family of hardy and accommodative little fishes which has representatives in warm countries all round the globe (except Australia) and in all sorts of water—the Cyprinodontidae.

Gambusia affinis can thrive in what would seem to be very inauspicious circumstances—in dirty water, water choked with weed, water just deep enough to swim in—also in waterbutts, etc., but not in salt water or water containing iron-rust. Like many of its family it is viviparous, and a mother may produce 50 to 100 young at a birth. Although it can stand hunger for a long time it has an insatiable appetite. It swallows its own fry, at a rate, so the observers state, of seven in a minute, even when other good food is at hand. An adult, so they state, can devour 1,209 mosquito-larvae in the course of a day. Anopheles eggs are included in its fare, but not the egg-rafts of Culex. With all its prowess as a larvicide and pupicide, it cannot abide cold; at temperatures below 50° F. it retires to the bottom and goes to sleep. Naturally it does not like petroleum and Paris green; but petroleum is here stated to be not harmful if waterweed is present, and some individuals can survive even an introduction to Paris green, it is said.

A. A.

Deraniyagala (P. E. P.). **Some Probable Ceylon Larvivores.**—*Ceylon Jl. Sci.* (Sect. D. Med. Sci.). 1930. Nov. 7. Vol. 2. Pt. 4. pp. 191–201. With 3 plates.

This is intended " to assist officers engaged upon malaria control . . . to identify the commoner fishes of Ceylon which are likely to prove of value as destroyers of mosquito larvae." About twenty fresh and brackish water species are very briefly but very distinctively described under their scientific and vernacular names, and thirteen of them are figured *simplex munditiis* but with eloquent effect; furthermore, there is a short and sufficient glossary. Under such auspicious guidance the identification of the fishes will be labour of the kind that physics pain.

A. A.

Khalil (M.). Introduction du poisson *Gambusia affinis* en Egypte, dans le Soudan anglo-égyptier, à Chypre et en Syrie pour combattre le paludisme. [**Introduction of *Gambusia affinis* into Egypt, Cyprus and Syria.**]—*Ann. Parasit. Humaine et Comparée.* 1930. Dec. 1. Vol. 8. No. 6. pp. 593–597. [Parasit. Dept., Faculty of Med., Cairo.]

This is a story of the introduction of the Cyprinodont fish *Gambusia affinis* into Egypt in 1926. Of these fishes, 394 were transported from a Corsican colony to Alexandria. Only 21 died in the course of transport, which occupied 3 weeks; the rest were railed at once to Cairo (4 dying on the journey), where 150 were distributed in fountains, waters of public gardens, and fish-ponds, and 131 in three larger ponds. After the lapse of about a year fishes were caught from time to time for stocking fresh localities. In the course of sixteen nettings made in fountains, etc., during the subsequent two years more than ten thousand of the progeny of these fishes were caught; but nothing has been seen, so far, of progeny of those liberated in two of the large ponds. *Gambusia affinis* may now be regarded as well established in Egypt; it has been distributed widely and in 1929 was placed at the disposal of the Public Health Department.

A. A.

Brasil (Vital) & Vellard (J.). Das Gift der brasilianischen Spinnen. [**Venom of Brazil Spiders.**]—*Seuchenbekämpfung.* Vienna. 1930. Vol. 7. Nos. 1, 2 & 3. pp. 12–22; 96–111; 158–176. With 18 text figs. [3 pages of refs.]

Accident from spider-bite is not uncommon in Brazil; in and about São Paolo in 3 years more than 60 cases were treated—some of them severe. This paper contains a brief account of nearly thirty of the more notorious Brazilian species of spiders, together with the authors' own observations of the nature and effects of their venom. It includes also a general history of the recorded lesions and injuries inflicted on man by spiders, together with a valuable bibliography containing 101 references, also an illustrated description of the venom apparatus of the spider and instructions for the removal of the venom glands and handling of venom. It therefore is more monographic in its outlook than

it appears in its title and should do much to stimulate and assist research in other countries.

Spider-venom is a colourless somewhat viscid fluid ; it dries at 37° C. as a light, yellow, hygroscopic powder soluble in distilled water and in saline ; its reaction is variable, according to the authors it is nearly always alkaline in warm or damp weather, and more often acid in cool weather. Its natural effects of course vary according to the species of the spider, but speaking generally the authors observe that in their experience it is not proteolytic, seldom (only in Nephila) coagulant, and not often—and then but slightly—haemolytic. Specific spider-venoms may be arranged in two groups according to their most pronounced effects. In one group come venoms that are neurotoxic like certain snake-venoms ; here the salient symptoms show excitation followed by paralysis of the nervous system ending (with small mammals) perhaps in convulsions and death. In the other group prominent effects are seen only at the site of the bite—local inflammatory oedema followed by dry necrosis of the skin. As one Brazilian example of a neurotoxic spider-venom take *Ctenus ferus*, of which the first effect is acute pain, followed by shivers and tremors and general tetany, convulsions and progressive paralysis ; also salivation, lacrimation, increased bronchial secretion, diarrhoea ; retention of urine, quickened breathing, tachycardia, arrythmia ; in laboratory animals the venom is quickly eliminated if death does not follow within an hour. *Acanthoscurria sternalis*, the *Carangue jeira*, affords another example of a neurotoxic venom. Here heightened reflexes and blind uncoordinated movements are followed by tremors, rapid pulse, vomiting, increase of all secretions, diarrhoea, and polyuria ; then comes lethargy and either slow death or slow recovery ; and with these neurotoxic symptoms, there is great swelling and hyperaemia at the site of injection of venom. As a good example of a spider-venom that has almost no generalized effects the Brazilian *Lycosia raptoria* is conspicuous. Some hours after injection of the venom inflammatory swelling and vesiculation occur at the site, next day a zone of white dry necrosis of the affected skin is seen ; this spreads for 15 to 25 days leaving at last a large excavated ulcer, which may take 2 or 3 months in granulation ; the scar is like tortoiseshell and often painful.

In dealing with the venomous spiders of Brazil and their venoms the authors take the species each one in its zoological precedence, briefly describe them and their provenance, and then discuss the nature and effects of their venom as studied in the laboratory but occasionally as observed in hospital.

A. A.

Browning (W. H.). **Arachnidism—Spider Poisoning.**—*New Orleans Med. & Surg. Jl.* 1930. June. Vol. 82. No. 12. pp. 873–875. [3 refs.]

Report of a case in a man of 39 years, bitten on the glans when at stool, by a black spider. About 15 minutes afterwards he was taken with pain in the groins. About half an hour after that he was admitted to hospital cyanotic, writhing with pain radiating from the precordium to the left shoulder and arm, and in a profuse sweat. Nitroglycerin (1/100 grains) under the tongue gave considerable and quick relief. About four hours after admission his temperature was 101° F. and he complained of weakness and general aching ; but after a hypodermic injection of morphine he rested fairly comfortable. About 21 hours after being bitten his temperature was normal and he was discharged, feeling generally weak. At no time was there any local evidence of the bite. The spider was not identified, but since the paper is prefaced by an account of the symptoms following the bite of *Lathrodectes mactans*, by Bogen (see this *Bulletin*,

Vol. 24, p. 401 ; see also Vol. 26, p. 278, TROISE), it would seem that this species was suspected.

A. A.

WALSH (Groesbeck). **Arachnidism : a Case of Poisoning from the Bite of** *Latrodectus mactans.—Southern Med. Jl.* 1930. Nov. Vol. 23. No. 11. p. 1038. [3 refs.] [Employees' Hosp., Tennessee Coal, Iron & Railroad Co., Fairfield, Ala.]

The patient in this case was a white man of 51 years, and the spider was properly identified as *Lathrodectes mactans*. The man was bitten in the right foot at 8 a.m. Twenty minutes afterwards he began to feel pain there—pain that gradually spread all along the right side until it reached the head and then became general. There was no difficulty of respiration. Admitted to hospital within four hours, he only cried aloud for something that either would stop the pain or would kill him outright. The abdomen then was distended and as stiff as a board, the peripheral tendon-reflexes were excitable, the skin was cold and clammy and the temperature subnormal (97° F.). Despite an early hypodermic of morphin and a subsequent dose of morphin (1/6 gr.) and atropin (1/200 gr.) in a solution of mag. sulph., mental disturbance and violent pain persisted until the evening and the abdominal rigidity into the night. The man did not recover his normal state until the following day when he was discharged complaining only of numbness and soreness of muscle.

The author has seen 13 cases of what has been believed to be bite from *Lathrodectes mactans* ; all of the patients suffered extremely from generalized pain, and some like the present patient were half delirious, but the characteristic feature of them all has been " the intense board-like rigidity of the abdomen," closely resembling that seen after rupture of a viscus or perforation by a gastric ulcer.

A. A.

ESSEX (Hiram E.), MARKOWITZ (J.) & MANN (Frank C.). **The Physiologic Action of the Venom of the Honeybee** (*Apis mellifera*).—*Amer. Jl. Physiol.* 1930. July 1. Vol. 94. No. 1. pp. 209–214. With 7 figs. [3 refs.]

A study of the physiological effects of honeybee-venom (*Apis mellifera*). By intravenous injection into dogs and rabbits it induces a rapid fall of blood-pressure with decrease in volume of the kidney, increase in the volume of the hindleg and ultimately (in the dog) splanchic dilatation and haemorrhage ; and into guineapigs occlusive bronchospasm. Added to the perfusing fluid it rapidly incapacitates the isolated heart of the rabbit and causes maximum contraction of the isolated uterus of the virgin guinea-pig. Injected into the human skin it causes a reaction identical with that caused by (diluted) rattlesnake venom and by histamine. The venom is markedly haemolytic, haemolysis being preceded by a large increase in the volume of erythrocytes. Apart from the fact that failure of the heart is sometimes preceded by a short rise in blood-pressure, its physiological effect is similar to that of rattlesnake venom. Venom for experiment was obtained from lethargic winter bees. They were chloroformed *en masse*, the sting was thrust out by pinching the abdomen and then was seized and pulled clean out, with the venom-bag adhering, with a fine forceps. The venom-bag is then torn open with needles and its contents allowed to diffuse in a mixture of Ringer-Locke solution and glycerine, equal parts. Ten venom-bags to 1 cc. of the mixture is a convenient dilution.

A. A.

Ôta (Masao). Etude expérimentale sur le venin de la punaise des lits. [**Experimental Study of Bed-Bug Venom.**]—*Japan. Jl. Dermat. & Urol.* 1930. Sept. Vol. 30. No. 9. pp. 966–976. With 1 text fig. [6 refs.] [In Japanese. French summary pp. 100–102.]

In 1919 in a paper on the venom of the bed-bug (*Cimex lectularius*) Ota expressed his disagreement with Klausner (1916) who had affirmed the venom to be haemolytic. Miyake's (1922) observations are more in accord with Ota, who now repeats that an *aqueous* extract of bedbugs can kill small animals like mice and frogs, and in most men—although some persons are not susceptible—provokes urticaria and intense itching, and that it is not haemolytic to sheep, rabbit, rat, or man. For this aqueous extract 1 gm. of the insects is washed in ether and alcohol, then crushed and macerated in 5 cc. of normal saline and filtered. Its venomous properties are destroyed by heat at 100° C. for half an hour, but not at 56° C.

A. A.

Vassiliadis (P.). La fonction antiparasitaire de la rate décélée par la splénectomie. [**The Antiparasite Function of the Spleen revealed by Splenectomy.**]—*Arch. Internat. de Méd. Expérim.* 1930. Sept. Vol. 6. No. 1. pp. 89–118. [40 refs.] [Bact. Lab., Univ., Louvain.]

The defence exercised by the spleen against certain parasites, the evidence for which comes to light only after the organ has been removed, may be shown (*a*) in restricting the numbers of the parasite, (*b*) in mollifying the character of the parasite, and (*c*) in occulting the parasite. Leaving aside here the production of antibodies, the restrictive effect on numbers may be observed when fieldmice or harvestmice having a "spontaneous" infection of the spirillum of Sodoku are subjected to splenectomy; after the operation the numbers of the spirillum are increased. The existence of a mollifying influence is apparent when an infection with *Trypanosoma lewisi* is communicated to a rat that has been desplenated; the altered rat suffers from sickness and anaemia, and may die—the normally harmless trypanosome becomes pathogenous. Again, *T. lewisi*, to which the harvestmouse is normally refractory, and *Eperythrozoon coccoides*, to which the rabbit is normally refractory, may become infective when those animals are desplenated. To illustrate the occultation of a parasite by the spleen the author gives at full length (twenty pages) the history of *Bartonella muris* and the pernicious anaemia of desplenated rats, and also of the innocuous *Eperythrozoon coccoides*; but as the substance of this story has recently been noticed at some length in this *Bulletin* (1929, Vol. 26, pp. 519–523) it need not be repeated.

A. A.

Gambia, Colony of the: Annual Medical and Sanitary Report for the Year 1929, p. 20.—IX. Scientific. **Notes by Dr. F. A. Innes, Medical Officer of Health.**

Of the three items of information one records that two 75,000-gallon fresh-water tanks in Gambia colony have been free from mosquito larvae for years, this being attributed to the presence in the water of

numbers of *Anisops*[1] *pellucea* larvae. Another item records the removal from a tumour (in the thigh of a native soldier) of *Onchocercus volvula*[2] —a parasite not reported from Gambia before.

A. A.

Bacigalupo (Juan). La *Limnaea viatrix* d'Orbigny, huésped intermediario de la *Fasciola hepática* L. en la República Argentina. (Nota previa.) [*Limnaea viatrix* **Orbigny, the Intermediate Host of** *Fasciola hepatica* **in the Argentine.**]—*Semana Méd.* 1930. Nov. 13. Vol. 37. No. 46 (1922). pp. 1481–1484. With 5 text figs. [1 ref.]

Infestation with *F. hepatica* is frequent in animals in the Argentine ; in Buenos Aires sheep are mostly affected, in San Luis, Córdoba, La Rioja, Catamarca and Tucumán goats more particularly, but in the slaughter houses the parasites may be seen in the livers of cattle, pigs and goats and the geographical distribution of the parasitism is found to coincide exactly with that of *L. viatrix*. In June 1930 the author examined 20 specimens of Limnaea but found none infected naturally, though he was able to infect and obtain development in them experimentally. It is interesting to note that in human cases, he obtains positive intradermal reactions by using hydatid fluid and the complement deviation is also positive with hydatid antigen, while *vice versa* the two tests are not absolute with an antigen prepared from *F. hepatica*, since they are given also by patients with hydatid cysts.

H. H. S.

Pallary (Paul). Résultats d'une prospection zoologique des eaux douces de la Syrie au point de vue médical. [**A Medico-Zoological Survey of Syrian Streams.**]—*Bull. Acad. Méd.* 1930. Mar. 11. Year 94. 3rd Ser. Vol. 103. No. 10. pp. 267–269.

The author examined districts of Syria from which schistosomiasis has been reported but was unable to find Bullinus, except at Saida, where *B. asiaticus* exists. He thinks that owing to the swiftness of the streams in Lebanon and Antilebanon there is little danger of schistosomiasis becoming established. He has not, however, been able to examine the left bank of the Euphrates. He found a Limnaea which acts as host for a liver fluke, and recommends its elimination.

A. G. B.

Daleas (Pierre). Le haricot vert annamite contre les méfaits du millepattes. [**The Annam Bean for Centipede Lesions.**]—*Bull. Soc. Méd.-Chirurg. Indochine.* 1930. July. Vol. 8. No. 7. p. 742.

Short notices of two cases of painful blistering caused by a centipede, where the pain ceased in two or three hours and the vesication healed within 48 hours after application of a poultice of chewed and slobbered green beans. A referee, Dr. Sallet, states that the centipede is a Geophilus and the bean is the *Dau xanh*, or Mungo pea, *Phaseolus radiatus*, a richly farinaceous and much appreciated food, also used in Annamese medicine

[1] ὤψ is feminine and must have the adjective in the feminine.

[2] Onchocercus is said to be derived from ὄγκος and κέρκος (there being no Greek word "κερκα"). κέρκος being feminine must have the adjective feminine in agreement.

as a diuretic and invigorant. He attributes the effect on the lesion mainly to the bean, although the Annamese think the saliva to be the better part, since they use the pure saliva (of the cock) for centipede wounds and make use of chewed grain and chewed leaves as topical applications for other poisoned wounds.

A. A.

Montgomery (Hamilton). **Larva migrans (Creeping Eruption).**—*Arch. Dermat. & Syph.* 1930. Nov. Vol. 22. No. 5. pp. 813–821. With 3 figs. [19 refs.] [Mayo Clinic, Rochester, Minn.]

Description of a case of larva migrans identified by Prof. W. A. Riley as Gastrophilus. The patient, an elderly farmer working in the field, felt a pricking (on flexor surface of right arm) that soon after became obvious as a small reddish papule. From this the usual tortuous line advanced, with itching, at the rate of 1·5 to 2 cm. daily. About the 12th day a small piece of skin containing the migrating larva was excised for identification. The larva lay in a burrow between the epidermis and cutis causing slight inflammatory reaction in both. The author describes the histology of the tunnel in detail and discusses the various organisms that figure as migrating larvae—the larvae of bot flies (Oestrus, Gastrophilus and Hypoderma), the nematodes of the genus Gnathostoma, the larvae of the hookworm *Ancylostoma brasiliense*—and he states emphatically that which one of them is present in any given case can be positively decided only by actual demonstration of the organism, not by the nature of the burrow. An instructive paper, well documented.

A. A.

Greig (David M.). **Thanatophoric Fish.**—*Edinburgh Med. Jl.* 1930. Nov. Vol. 37. No. 11. pp. 638–640. [5 refs.]

The venomous fish of this paper is the well-known weever-fish (Trachinus) of European seas. A reported case of fatal paralysis " probably " due to its sting is criticized. References are given to W. N. Parker's account (*P. Zool. Soc.* London, 1888, p. 359) of its poison apparatus, to Dunbar-Brunton's account (*Lancet*, 1896, Vol. 2, p. 600) of its venom, and to other earlier authors.

A. A.

Porter (Annie). **Certain Animal Parasites affecting Man in South Africa.**—*Jl. Med. Assoc. South Africa.* 1930. Aug. 23. Vol. 4. No. 16. pp. 471–474.

This is an instructive lecture taking a bird's-eye view of the subject but not containing anything new in the way of observation or experiment

A. A.

Kopstein (F.). *Rattus concolor otteni*, nomen novum.—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1931. Jan. 1. Vol. 71. No. 1. pp. 3–5. [Pasteur Inst., Bandoeng, Java.]

The author separates this subspecies (already known in plague literature as "harbour concolor") from *R. concolor cphippium* (the " mountain concolor " of plague literature) and *R. concolor equile*. It is to be distinguished from the other two subspecies principally by (1) its dark belly (hardly lighter

than the back), (2) its smaller size (body length without tail maximal 107 mm., against 130 mm. in *ephippium*). It has so far only been found in various ports on the north coast of Java.

W. J. Bais.

George (Ira D.). **Short Report of Work of the Snake Farm at Lancetilla, Tela, Honduras.**—*Eighteenth Ann. Rep. Med. Dept. United Fruit Company, Boston, Mass.* 1929. pp. 326–332. With 9 text figs.

Cudlipp (J. S.). **Snake-Bite Cases in 1929, with General Comments.**—*Ibid.* pp. 332–351.

Brosius (Otto Tiemann). **Boa Bite Case Report.**—*Ibid.* p. 352. [Chiriqui Land Co. Hosp., Puerto Armuelles, Panama.]

George says a few words about the snake " farm " at Lancetilla in Honduras, where the local reptiles are studied and the deadly snakes are made to render their venom to the serologist. Some of these snakes are figured, like as life. Cudlipp gives short abstracts of 39 cases of snake-bite treated, but they are not of much value since in 16 of them the snake was not identified, and in 9 of these there were no symptoms. Two cases, however, where the snake is said to have been a *terciopelo* (=*barba amarilla*, *Fer de Lance*, *Lachesis atrox*) were fatal. Of more value is the record of 104 cases of snake-bite (verified or alleged) treated in the course of three years—1927 to 1929—among a population of 150,000, chiefly agricultural labourers. Of these cases seven were fatal. In four of the fatal cases the snake was not identified; the salient symptoms mentioned are local painful swelling and discoloration, and bleeding from the mucosae; death followed (where the interval is known) 39 hours, 4 days, and 6 days after the accident. In one case the snake was said to be *Lachesis mutus* (bushmaster), and here too the prominent symptoms besides local painful swelling and discoloration, and vomiting of blood and bleeding from the nose, were pains in the abdomen, and bullous blistering of the swollen limb; death took place 24 hours after the accident. In the last two cases (1929) the snake was a *terciopelo* (*Lachesis atrox*), and in one of them the fatal result might possibly have been determined by the treatment received before admission to hospital; in the other the striking symptoms were great swelling of the bitten leg and copious spitting of blood, and death occured 19 hours after the accident. In all the cases here reviewed the victim received proper modern treatment after admission to hospital. Brosius reports a case where the aggressor snake is said to have been a boa, but he gives no relevant particulars, except a figure of the fang-marks.

A. A.

Kellaway (C. H.). **Observations on the certainly Lethal Dose of the Venom of the Black Snake** (*Pseudechis porphyriacus*) **for the Common Laboratory Animals.**—*Med. Jl. Australia.* 1930. July 12. 17th Year. Vol. 2. No. 2. pp. 33–41. With 2 text figs. [7 refs.] [Walter & Eliza Hall Inst., Melbourne.]

This interesting research reminds us that Martin (*Proc. Roy. Soc. New South Wales*, 1895, Vol. xxix, p. 146) has given a very complete knowledge of the mode of action of the venom of the Australian Black Snake, *Pseudechis porphyriacus*. By intravenous injection in sufficient dosage this

venom is rapidly fatal by intravascular coagulation. It has too a haemolytic action (very notable in the dog) and attacks also the endothelium of the blood-vessels, causing haemorrhage into organs. When injected subcutaneously or into a vein, after destruction of the " thrombase " by heat, it displays a neurotoxic action in lessening reflex activity and notably in fatal paralysis of the respiratory centre. But if life be maintained by artificial respiration the additional action on the heart is shown, death shortly occurring by cardiac failure with a profound fall of blood-pressure that is only partly of vasomotor origin.

In the present study of the immunity response to this venom a number of exact experimental observations of its effects on the rabbit, guineapig, rat, and mouse are summarized as well as a few on the horse, monkey, and cat, and the results, which include notes of the symptoms and gross pathological findings, are recorded. The certainly lethal subcutaneous dose for most of these animals and the certainly lethal intravenous dose for the first four species has been determined. Comparison of the effects of this venom and of *P. guttatus* and of *P. australis* " shows that these venoms are closely similar in action, and that their certainly lethal doses for different species are all of the same order."

A. A.

Thomson (Donald F.). **Observations on the Venom of a Large Australian Snake,** *Pseudechis australis* **(Gray). 1. Synonymy.**—*Australian Jl. Experim. Biol. & Med. Sci.* 1930. Sept. 16. Vol. 7. No. 3. pp. 125–133. With 7 figs. (1 on a plate). [10 refs.]

Kellaway (C. H.) & Thomson (Donald F.). **Observations on the Venom of a Large Australian Snake,** *Pseudechis australis* **(Gray). 2. The Venom Yields and Venom.**—*Ibid.* pp. 134–150. With 2 figs. (1 on a plate). [5 refs.] [Walter & Eliza Hall Inst., Melbourne.]

This is a very painstaking monograph of *Pseudechis australis*. The first part (Thomson) heals with synonomy and generic and specific characters ; the second part (Kellaway & Thomson) with the biting apparatus and the effects of the venom as observed by subcutaneous and by intravenous injection into large numbers of animals of several species in graduated dosage. In summary, the venom is stated to be much less toxic than the venoms of *Notechis scutatus* (tiger snake), *Acanthophis antarcticus* (death adder), *Denisonia superba* (copperhead), *Oxyuranus maclennani*, and *Diemenia textilis* (brown snake), the toxia being of the same order as that of its congeners *P. porphyriacus* and *P. guttatus*. As with these two congeners, too, the venom is powerfully haemolytic, but it is unlike theirs in not possessing thrombase—it having a more powerful anticoagulant action than the venom of any other Australian snake yet studied. Evidence of neurotoxy was " conspicuously absent " in sheep, but early ptosis was observed in some monkeys, weakness and ataxia in rats and mice and incoordination in some rabbits, and some effect on the respiratory centres in some of the victims. The venom possibly contains a haemorrhagin. Unlike most Australian venoms, the venom has a striking action on the heart-muscle.

A. A.

Kellaway (C. H.). **Local Venesection in the Treatment of Snakebite of the Limbs.**—*Med. Jl. Australia.* 1930. Apr. 26. 17th Year. Vol. 1. No. 17. pp. 551–552. With 1 text fig. [1 ref.] [Walter & Eliza Hall Inst., Melbourne.]

A modified method of intermittent blood-letting—e.g. from the forearm in the case of a fingerbite from a deadly snake—with the aim of washing-out some of the venom, is described in detail. The idea is

intermittently to stop the venous return without at the same time staying the arterial flow. But, as the author allows, the whole promise of the method lies in starting it " during the first few minutes " after infliction of the bite ; and, again, the effects of haemorrhage must not be superimposed on those of shock from venom.

A. A.

KELLAWAY (C. H.). **Local Venesection in the Treatment of Snake Bite : an Experimental Study.**—*Med. Jl. Australia.* 1930. Sept. 13. 17th Year. Vol. 2. No. 11. pp. 351–360. [13 refs.] [Walter & Eliza Hall Inst., Melbourne.]

This valuable experimental study will be appreciated by all who are interested in the fundamentally important subject of animal venoms. Sheep were used for experiment. A tense rubber tourniquet was applied above the carpal joint of the forelimb to arrest the arterial flow, and immediately distal a narrow cotton bandage to control the venous onflow, and the venom was then injected subcutim in the vicinity of the metacarpo-phalangeal joint. A superficial vein behind the carpal joint was now incised and, at five-minute intervals, during the course of about an hour the arterial ligature was removed for 1 to 1½ minutes to allow free bleeding from the venesection wound. In most of the experiments 280 to 400 cc. of blood was drawn, but even greater amounts could be taken from the larger animals without obvious hurt. To begin with the author reviews some carefully recorded experiments to determine the utility of simple ligature without any other treatment, some of them showing that in the case of a coagulant venom a very prompt and effective ligature is sufficient to save an animal's life. And, of course, the author insists that for delaying the passage of venom into the circulation and thus extending the precious time for other action, effective ligation " must remain the first and most important step in the treatment of snake-bite."

The object of the present experiments being to determine the utility of ligation followed by local venesection, the first step in the investigation was to ascertain whether the blood so drawn really contained any sensible quantity of venom ; various experiments settled this question in the affirmative. Experiments were next undertaken to determine the utility of this mode of treatment after the injection of the venom of the Death Adder (Acanthophis), of the Tiger snake (*Notechis scutatus*), of the Copperhead (*Denisonia superba*) and of the Brown snake (*Diemenia textilis*).

Seven sheep received from 3 to 1¼ lethal doses of Death Adder venom and were bled locally to the extent of from 100 to 400 cc. ; five died in 17 hours to about 4 days ; of 2 that had received 1½ lethal doses and had been bled to the extent of 350 to 310 cc., one survived without symptoms, the other recovered on the fourth day, after suffering from slight ataxia. Four sheep received from 1½ to 1¼ lethal doses of Tiger snake venom and were blooded to the extent of 390 to 280 cc. ; two recovered on the 7th to 13th days, after suffering from weakness and paralysis ; one survived without symptoms ; one was killed, after recovery and relapse. Four sheep received from 1¼ to 1 lethal dose of Copperhead venom and were bled up to 240 to 350 cc. ; one died in 24 hours ; the other 3 were paralysed at first and one died on the 13th day, but the other 2 recovered by the 12th day or after. Five sheep received from 0·03 to 0·02 mgm. per kilogm. of *Diemenia textilis* venom and were blooded to the amount of 140 to 360 cc. ; one died from thrombosis in 22 minutes, and another died on the

6th day ; 2 survived without symptoms (one had to be destroyed owing to a damaged limb) ; the probably lethal subcutaneous dose of this venom is something less than 0·02 mgm. per kilogm.

All the author's work is described in admirable detail, which, however, cannot be summarized to any useful purpose. The results of the experiments upon sheep show that local venesection controlled by ligature, if the treatment can be applied immediately, may in favouring circumstances save life in cases of bites by Death Adder and Tiger snake ; but in the case of Copperhead and Diemenia venom the prospects are not so promising. For, as the author allows, " the obvious difficulty in applying this treatment is the practical one that snake bites seldom occur when a doctor is at hand."

A. A.

Reddingius (T.). Een geval van slangenbeet (*Ancistrodon rhodostoma*). [**A Case of Snake Bite** (*Ancistrodon rhodostoma*).]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1931. Jan. 1. Vol. 71. No. 1. pp. 30–34. [Med. High School, Batavia.]

A European of 46 was bitten a little above the ankle. The local symptoms were swelling and subcutaneous haemorrhage extending to and over the knee. The general symptoms were very slight and short collapse. Recovery followed, for which the author is inclined to give little credit to the treatment (excision of the wound, temporary constriction of the leg, antivenomous serum).

W. J. Bais.

Owtscharenko (E. P.). Pathologisch-anatomische Veränderungen des Zentralnervensystems bei Vergiftung mit Kobragift. [**Pathological Changes of the Central Nervous System in Poisoning by Cobra-Venom.**] —*Arch. f. Schiffs- u. Trop.-Hyg.* 1930. Dec. Vol. 34. No. 12. pp. 657–661. With 1 text fig. [8 refs.]

After a slender introduction to the Indian cobra and its venom the histopathology of the brain of cobra-poisoned mice is described in detail [slow poisoning—death in 4 to 6 hours]. From his observations the author concludes that cobra toxin causes paralysis of the vasomotors followed by local stasis and subsequent corresponding necrosis.

A. A.

Arthus (Maurice). Les anavenins (premier mémoire). Destruction de la toxicité des venins par le formol. [**Preliminary Memoir on Anavenins. Detoxification of Venoms by Formol.**]—*Jl. Physiol. et Path. Gén.* 1930. Vol. 28. No. 3. pp. 529–543. [1 ref.]

In his prologue the author refers to G. Ramon's discovery of anatoxins (*Ann. Inst. Pasteur*, Jan. 1925, Vol. 39, p. 1). Ramon gave the name " anatoxin " to bacterial toxins that have been rendered non-toxic by an addendum of formic aldehyde (formalin). The innocuous anatoxin imparts or engenders immunity against the toxin. Ramon also showed that by addition of formalin cobra-venom also became transformed into an inoffensive anatoxin with a specific immunizing property. He stated that a solution of 50 cgm. of dry cobra venom

in 200 cc. of saline—a solution of which 0·5 cc. subcutim would kill an 1,800 gm. rabbit in 5 hours—was quite harmless to rabbits in a subcutim dose of 100 cc. after admixture and subsequent incubation for a month with 0·4 to 0·5 cc. of formalin solution. Moreover, rabbits that received at 4 or 5 days' intervals increasing subcutim doses of 5, 10, 12, 15 cc. of the formalinized venom (anavenin) thereby were made refractory to 50 mgm. (40 mortal doses) of the pure venom. The author also quotes Mme. Heymans (*Arch. Intern. de Pharm. et de Therap.*, 1926, Vol. 32, p. 101) on the attenuation and protective utility of cobra anatoxin.

The present paper is a long and interesting symphony on this theme ; in consonance and plentiful harmony, and with movements bringing *Naja bungarus* (King Cobra), *Naja flava, Naja haje, Vipera russellii, Vipera aspis, Lachesis lanceolatus* (Fer de Lance), *Crotalus terrificus* and *Crotalus adamanteus*—Europe, Africa, Asia, and America—all in concord on this subject of formalinized snake-venoms or anavenins.

A. A.

Arthus. Pour mieux connaître les anatoxines. [**For Better Understanding of the Anatoxins.**]—*Bruxelles-Méd.* 1930. Nov. 2. Vol. 11. No. 1. pp. 1–13.

For better understanding of the anatoxins we are here invited to study the snake anavenins. We begin with Ramon's discovery that formol translates bacterial toxins into harmless immunizing anatoxins, and in particular with his discovery that under the prolonged action of formol at a temperature of 38° cobravenom is deprived of its toxic powers though not of its immunizing properties. Mme. Heymans corroborated this discovery, with the reservation that the toxicity was diminished, not *completely* suppressed, and the immunizing properties weakened by formol. The present author also, who has experimented with venoms of Naia, Bungarus, Viper, Lachesis and Crotalus, has confirmed the discovery ; he states that this neutralizing action of formol is easy to demonstrate, and also that he has immunized laboratory animals with formolized venoms of several species of thanatophidia against mortal doses of the severally corresponding venoms. Since, then, the specific formolized venoms are both specifically antitoxic and antigenic, why not call them " anavenins " in analogy with anatoxins ? The author is at this point confusing, and we are left not quite certain whether cobra-anavenin, which furnishes so much of the subsequent discourse, is entirely detoxified, or whether it retains 1/200 part of the toxic power of the original venom—until the end of the paper is reached.

The main object of the paper seems to be to explain that formolized venoms or anavenins besides being non-toxic and immunizing, are also, like venoms, in certain circumstances anaphylactic and capable of inducing a proteotoxic or anaphylactic shock in animals already sensibilized by anavenins. This anaphylactic shock is exhibited, for instance, when an animal (rabbit) having been sensitized by cobra anavenin (or by non-mortal doses of cobra venom) receives some time afterwards an intravenim dose of cobra venom. Death occurs prematurely, and is preceded not by the usual symptoms of cobra-poisoning but by a sudden fall of blood-pressure and by quickened respiratory rhythm and other symptoms which the author regards as due to serum-toxins and not to specific toxins of the venom. The author's final

statement is that formol entirely suppresses the toxicity of venoms. He adds that since the immunization of rabbits by injection of anavenins induces a state of anaphylaxis and the injection of anavenin into an already sensitized rabbit may precipitate an anaphylactic shock, it is not necessary therefore to conclude that immunization of children by diphtheria anatoxin must be renounced.

A. A.

Vellard (J.) & Penteado (Jarbas). Action des rayons ultraviolets sur les venins. [**Effects of Ultraviolet Rays upon Venoms.**]—*C.R. Acad. Sci.* 1930. Sept. 15. Vol. 191. No. 11. pp. 458–460.

A study of the effects of ultraviolet irradiation upon the venoms of the snakes *Lachesis atrox* and *jararaca*, *Crotalus terrificus*, and *Naja tripudians*, and the toad *Bufo marinus*. Solutions of the venom were exposed in glass plates to irradiation from a quartz lamp, at 25 cm., for 2 up to 45 minutes. As the result of evaporation the solutions became viscid (excepting *L. atrox*), their colour changed, and (excepting Lachesis) opalescence and precipitation took place. The acidity of the solutions increased; the toxin of the toad was but slightly affected, but with snake-venom there was attenuation of the globulins increasing with length of exposure; the precipitates were always inactive. With large doses of venom irradiated for 45 minutes, the authors, contrary to the experience of Arthus and Favre, were able to protect and to immunize guineapigs and goats.

A. A.

i. Vellard (J.) & Vianna (Miguelote). Technique pour la réaction de fixation du complément avec les sérums anti-ophidiques. [**Technique for the Complement-Fixation Reaction with Antophidic Sera.**]—*C.R. Soc. Biol.* 1930. Oct. 16. Vol. 105. No. 27. pp. 101–103.

ii. —— & ——. Spécificité de la réaction de fixation du complément avec des sérums monovalents anti-*Lachesis*. [**Specificity of the Complement-Fixation Reaction with Univalent Anti-Lachesis Serum.**]—*Ibid.* pp. 103–105. [Bios Inst., Nictheroy, Brazil.]

i. In this preliminary paper are described various technical methods for the fixation of the complement with antophidic sera, especially for determining the specificity of the fixation. The test cannot be summarized.

ii. Studying particularly the complement-fixation reactions of univalent anti-Lachesis sera with their corresponding venoms the authors find that these antibodies, like the other antibodies (antitoxic, anticoagulant, etc.) of the sera are in a high degree specific. They fix their corresponding venom energetically. Venoms of other species may also be fixed, but in some minor degree corresponding with their zoological affinity with the species that furnished the venom from which the antiserum was prepared.

A. A.

Otto (R.). Zur Wirkung der Schlangengiftantisera auf die Gifte europäischer Ottern. [**Action of Snake Antisera on the Venom of European Vipers.**]—*Ztschr. f. Hyg. u. Infektionskr.* 1930. Oct. 13. Vol. 111. No. 4. pp. 503–510. [1 ref.] [Robert Koch Inst., Berlin.]

Some experiments showing that mice by body-weight are considerably more tolerant of certain viper-venoms than guineapigs.

A. A.

Brazil (Vital), Jr. Ueber Komplementbindungsversuche mit Schlangengift-Immunseris. [**Complement-Fixation Experiments with Sera Immunized to Snake-Venoms.**]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1930. Vol. 69. No. 1/2. pp. 126–133. [6 refs.] [Vital Brazil Inst., Nictheroy, Brazil.]

Pure serological experiment with sera immunized to venoms of certain North American snakes : not amenable to summary.

A. A.

Hara (Y.). **Experimental Studies on the Poisons of Formosan Snakes. (II. Report.) The Influence of the Snake Poisons on the Resistance of the Red Blood Corpuscles, on the Velocity of Sedimentation of the Red Blood Corpuscles and on the Blood Coagulability.**—*Taiwan Igakkai Zasshi (Jl. Med. Assoc. Formosa).* 1930. Sept. No. 306. [In Japanese. English summary pp. 50–51.] [Govt. Hosp., Karenko, Formosa.]

This is the author's abstract of a purely academic exercise. Several kinds of desiccated venoms seem to have been studied, but the names of only two of them—*Lachesis gramineus* and *Ancistrodon acutus*—are mentioned.

A. A.

Cawston (F. G.). Acute Poisoning from Bee Sting, Recovery.—*Jl. Trop. Med. & Hyg.* 1930. Dec. 15. Vol. 33. No. 24. p. 391.

Cesarano (Umberto) & Giordano (Mario). Myiasi uretrale causata da larve di una Anthomyia (*Fannia canicularis*). (Nota preventiva.)—*Arch. Ital. Sci. Med. Colon.* 1930. Aug. 1. Vol. 11. No. 8. pp. 459–463. With 4 text figs. (2 coloured). English summary (5 lines) p. 463. [Lab. of Colonial Path., Villa Torri, Bologna.]

Evans (A. M.). On Certain Distinguishing Characters observed in *Anopheles funestus* Giles.—*Ann. Trop. Med. & Parasit.* 1930. Dec. 18. Vol. 24. No. 4. pp. 587–592. With 2 text figs. [6 refs.] [School of Trop. Med., Liverpool.]

Greenway (D.) & Croce (C.). Myiasis intestinal humana.—*Arch. Argentinos Enferm. Aparato Digest. y Nutric.* Buenos Aires. 1930. Oct.–Nov. Vol. 6. No. 1. pp. 35–46. With 6 text figs.

Koidzumi (Makoto) & Hakushi (Rigaku). The Anophelines of Formosa.—*Riv. di Malariologia.* 1930. May–June. Vol. 9. No. 3. pp. 232–235.

Lotze (Harald). Die künstliche Proteosomainfektion der Vögel. Ein Beitrag zur Frage der Immunität und Immunisierung bei Vogelmalaria. I. Mitteilung.—*Zent. f. Bakt.* I. Abt. Orig. 1930. Dec. 22. Vol. 119. No. 3/4. pp. 165–171. [44 refs.] [Hyg. Inst., Univ., Greifswald.]

Odriosola (Ricardo). Ein Beitrag zum Studium der Protozoenerkrankung des Darmes beim Kinde.—*Arch. f. Schiffs- u. Trop.-Hyg.* 1930. Dec. Vol. 34. No. 12. pp. 643–651.

Pavlovsky (E. N.). *Ornithodorus papillipes* Birula and *O. cholodkovskyi* n. sp.—*Parasitology.* 1930. June. Vol. 22. No. 3. pp. 355–360. With 17 text figs. & 1 plate. [2 refs.]

de Rook (H.) & Soesilo (R.). *Anopheles (Bironella) Papuae.*—*Meded. Dienst d. Volksgezondheid. in Nederl. Indië.* 1930. Vol. 19. Pt. 2. pp. 213–218. With 6 text figs.

Shannon (Raymond C.) & Junior (José Seraphim). Revisão do catalogo da fauna de anophelinos no Brasil. Com observações sobre algumas especies do grupo nyssorynchus encontradas na Bahia e Recife, consideradas de importancia como os mais provaveis vehiculadores de malaria nessa região. Revision of the Classification of Brazilian Anophelines, including Observations on some Species of the Nyssorhynchus Group found in Bahia and Recife and considered to be the most Important Malaria Vectors in this Region.—*Archivos de Hyg.* Rio de Janeiro. 1930. May. Vol. 4. No. 2. pp. 79–96. English summary.

Sinton (J. A.). The Female of *Phlebotomus nicnic* Banks.—*Indian Jl. Med. Res.* 1930. July. Vol. 18. No. 1. pp. 165–169. With 10 figs. on 1 plate. [4 refs.]

Sinton (J. A.). Notes on Some Indian Species of the Genus Phlebotomus. Part xxv. *Phlebotomus maynei* n. sp.—*Indian Jl. Med. Res.* 1930. July. Vol. 18. No. 1. pp. 195–198. With 10 figs. on 1 plate. [6 refs.]

LABORATORY REPORTS.

NIGERIA. **Annual Report of the Medical Research Institute, 1929** [CONNAL (Andrew), Director].—*Ann. Med. & San. Rep. Nigeria, 1929.* Appendix A. pp. 1–30. With 3 folding charts. [3 refs.]

Of 75,853 rats examined for plague, 71,027 being *Rattus rattus*, 430 were found infected, all but 5 of them being *rattus*. Of their fleas 4,864 were *X. cheopis* and 1,681 were *X. brasiliensis*, the remaining 6 being equally dog-flea and chigger. The usual signs of plague in the rat are described seriatim and the statistics of buboes recorded. Among noteworthy pathological investigations are (*a*) of three common types -eczematoid, vesicular or bullous, and ulcerative—of streptococcal dermatitis; the first may show crusts resembling impetigo, and the second may be mistaken in its early stage for scabies; (*b*) Ducrey infection (bacillus of soft sore) which, short of bacterial and histological examination, may be mistaken for granuloma inguinale; (*c*) cases of facial tuberculosis, in a yaws area, that do not respond to N.A.B. treatment, but have as a salient histological feature a preponderance of giant cells; in two cases acid-fast bacilli (intracellular) were seen, and inoculations from these into *rhesus* monkeys and from them to guineapigs gave ample corroboration of the bacillus; (*d*) cases of a disease simulating leprosy, the edges of the lesions infiltrated with giant cells, but no acid-fast bacilli visible; (*e*) intranuclear changes in the liver-cells in yellow fever—a fragmentation or excess of chromatin (staining dark blue with Giemsa) and the presence of abnormal granular, acidophil, material—apparently specific; (*f*) identification of Negri bodies in the brain of dogs from five stations in S. Nigeria; (*g*) a careful record of histological observations of the tissues in post-mortem material from a case of blackwater fever; (*h*) a long instalment of an investigation of the causes of the diarrhoeas and dysenteries of Lagos, which states that there is a steady flow of cases of dysentery in which neither *E. histolytica* nor *Bact. dysenteriae* can be detected; the organisms so far identified are *Bact. dys.* Flexner (34 cases), *Bact. dys.* Schmitz (2 cases) and *Bact. Morgani* (8 cases); but no cases of Shiga dysentery so far, although this organism has been isolated here in recent years; the Flexner bacillus occurs in "various types . . . some agglutinating strongly and some poorly with type sera," and "there is reason to believe that the poorly agglutinating strains form a type of their own." Abstracts are given of ten case-reports of blackwater fever, 7 British, the others Greek, Syrian, and native African; one in a female; ages ranging from 20 to 43 years; a first attack in all except the Syrian and the African. Subtertian parasites were seen in 5 cases; five cases were fatal. Of neoplasms 76 specimens were received, mostly with good clinical notes; 42 of them (40 from Africans) were malignant, 23 being classed under carcinoma, 4 under endothelioma, and 15 (including 2 melanotic) under sarcoma. Attention is drawn to the great variety of malignant tumours in Africans; to their unusually high incidence in children and adolescents; to the high percentage of diffuse carcinoma; and to the large percentage of liver cancers and of the constant relation of these to cirrhotic changes in the liver. In Entomology besides a vast amount of routine and recording, larvicides have been tried in the field, feeding experiments have been carried on, and a search for naturally infected "wild" anophelines has been made. In this search *A. gambiae* has been found

infected four times with malaria parasites (twice oocysts, twice sporozoites) and eight times with filaria; and *A. pharoensis* once, with oocysts.

A. Alcock.

i. Nigeria. **Annual Report of the African Hospital Laboratory, Lagos, 1929** [Morrison (H.), Pathologist].—*Ann. Med. & San. Rep. Nigeria, 1929.* Appendix C. pp. 51–61. With 2 charts.

ii. ——. **Annual Report on the Pathological Laboratory, Kaduna, 1929** [McCulloch (W. E.), Pathologist].—*Ibid.* Appendix D. pp. 63–76.

iii. ——. **Annual Report of the Pathological Laboratory, Calabar, 1929** [Ramsay (G. W. St. C.), Pathologist].—*Ibid.* Appendix E. pp. 77–82.

i. In the routine work, in a total number of 1,172 slides of malaria-infected blood 2·5 per cent. were quartan and all the rest were subtertian. Trypanosomes were found in 3 films, and microfilaria in 32—sheathed in 21, unsheathed in 11. The reporter fully endorses his previous critical appreciation of the Kahn test; he never uses an antigen more than 2½ months old, and he thinks that titration should be done once every 3 weeks. In 1,769 African faeces 948 showed Ascaris, 719 hookworm, 648 whipworm, 4 *Schistosoma mansoni*, 15 *Taenia saginata*, 116 flagellates, and 23 cysts and 39 free forms of *Entamoeba histolytica*. Of 24 stools plated 5 showed Flexner Y, and 2 Shiga infection. Of 1,664 African urines 30 contained eggs of *Schistosoma haematobium*, 3 only being from women. Of 445 African sputa 53 were tuberculous. Seventeen malignant tumours were determined histologically—12 carcinoma, 3 sarcoma, and 2 lymphosarcoma. An interesting account is given of an obscure case of carcinoma of the pancreas in a European. Comment is made on the not uncommon occurrence of primary cancer of the liver in Nigeria, and also on the frequency of cirrhosis of the liver and its possible part as one of the precursors of malignancy. Post-mortem evidence shows respiratory disease in the first place, and tuberculosis of various forms in the second, among 128 deaths from natural causes. The characteristic heaviness of the infection and semi-acute course of the disease in the pulmonary tuberculosis of Africans is commented on. Among the batch of interesting post-mortem reports is a case of intestinal schistosomiasis; the patient had been admitted with diarrhoea and (in the routine examination) with eggs of *S. mansoni* in stool and *S. haematobium* in urine; 3 days later he suddenly collapsed with all the signs of internal haemorrhage, and died; at the autopsy the large intestine was distended with blood, its wall was considerably atrophied, and eggs of Schistosoma were found from caecum to anus, little remained of the muscosa and submucosa, the liver on section showed the typical picture of a multilobular cirrhosis. Three cases of sudden death are noticed, all children, where the only adequate cause was a very obvious enlargement of the thymus.

ii. In 396 malaria infections the only parasite found was the subtertian. *T. gambiense* was present in 3 films, *Filaria perstans* in 9, *F. loa* in 1. In 1,567 African faeces Ascaris occurred in 61, hookworm in 222, whipworm in 27, *Schistosoma mansoni* in 19, *Taenia saginata* in 45, and *Entamoeba histolytica* cysts in 284 and active forms in 50.

In 1,081 urines the only noteworthy events are the finding of active *Entamoeba histolytica* in two European and two African cases, in all of which the beneficial results of injections of ematine were " dramatic." The tubercle bacillus was present in 17 of 167 specimens of African sputa. Of malignant tumours 15 were determined histologically—adenoma 2, carcinoma 4, epithelioma 4, endothelioma 1, sarcoma 2, melanoma 2. Frequent occurrence of gumma of the testicle is noticed.

Special attention to the subject has shown the Kahn test, now that the antigen is retitrated every month, to be more specifically sensitive than the Sachs-Georgi. Special investigation of pondsnails for cercariae was made ; 3 species were found and among them, in a Planorbis, a dicrurous apharyngous form presumed to be *Schistosoma haematobium.* Other subjects that received attention are milk of an indigenous cow (no tubercle or coli bacilli), sodawater (no coli, but a heavy crop of *Closterium spermoides*), and native drugs (apparently based on sympathetic magic), also nematode worms and snakes, and animal metabolism (cattle experiments).

iii. In 1,318 blood examinations the subtertian parasite occurred in 173, the quartan in 20, the benign tertian in 1, *Filaria perstans* in 282, *F. loa* in 38, *F. bancrofti* in 2. In 1,344 faeces Ascaris occurred in 1,019, hookworm in 688, whipworm in 469, Strongyloides in 62, tapeworm in 1, *Entamoeba histolytica* in 17, *Balantidium coli* in 1 (a child of 13 years, the first case observed by the reporter in Calabar in the course of six years). No malignant tumours came to light. Among the post-mortem records is one of a child about 18 months old that died in convulsions, without affording evidence of any sufficient cause of death except complete obstruction of the bowel in several places by knotted masses of dead ascarids. In another case the death of an anaemic and emaciated youth might (it is thought) be attributable in the ultimate resort to the activities of 43 ascaris living in the intestine. In a case of rabies Negri bodies were found in the basal ganglion cells of the brain.

A. A.

Bourguignon (G. C.). Rapport sur les debuts du fonctionnement du laboratoire de bacteriologie de Coquilhatville, année 1929. [**The Début of the Bacteriology Laboratory of Coquilhatville, 1929.**]—*Ann. Soc. Belge de Méd. Trop.* 1930. Sept. 30. Vol. 10. No. 3. pp. 341–361. With 6 text figs.

The Coquilhatville laboratory, although not then " armed at point exactly, cap á pé," made its debut in 1929. In its action against trypanosomiasis 3,913 natives were inspected and 2,394 laboratory examinations (lymph-glands, blood, c.s. fluid) made. In the course of four months 16 out of 59 natives and 3 of 8 Europeans examined were found to be tuberculous, but 59 native girls (2 to 12 years) were negative all to the tuberculin test. The malaria statistics—chiefly for the malaria season September-December—show, for 174 native girls (2 to 18 years) examined, 144 infected, viz., 134 malignant tertian, 7 quartan, and 3 both, mixed ; for 205 prisoners, all but 30 infected, all malignant tertian ; for 172 native hospital patients, 120 infected, 119 being malignant tertian, and 1 quartan ; and in a population of 553 Europeans 37 cases of malaria in three months—35 malignant tertian and 2 quartan. Of 1,666 native adults' stools examined for

intestinal parasites 1,364 were positive—hookworm, ascaris, trichuris, strongyloides, oxyuris (1 case), *Schistosoma haematobium* and *S. mansoni*; *Trichomonas intestinalis*, *Entamoeba histolytica* (2 cases), *Balantidium coli*, and Tyroglyphus; in 175 examinations of native girls, 155 positive—all the above species of worms with the exception of *S. haematobium* and the addition of *Taenia saginata* being represented; and in the native jail in 38 examinations 30 were positive.

A. A.

Annales de la Société Belge de Médecine Tropicale. 1930. Sept. 30. Vol. 10. No. 3. pp. 231–273. With 7 text figs. [7 refs.] Rapport sur le fonctionnement du laboratoire de Léopoldville-Ouest et des services annexes pendant l'année 1929. [**Leopoldville Laboratory Report for 1929.**]

Research from the Leopoldville laboratory has been published in *Bull. Soc. Path. Exot.* and *Ann. Soc. Belge de Med. Trop.* for 1929. The items here extracted are from the record of routine work. Of trypanosomiasis among natives 464 cases have been treated during the year, the number of new cases being 199; in the search for infection 4,461 laboratory examinations (lymph-glands, blood, and c.s. fluid) of natives have been made. Tuberculosis continues to increase to a disquieting extent; 74 new cases have been detected in natives and 7 in Europeans. B.C.G. vaccination has been received by 137 newborns. Malignant tertian malaria was diagnosed in 989 natives and 72 Europeans, quartan in 55 and 5, mixed malignant and quartan in 4 natives; malaria statistics show gradual acquisition of resistance to malaria with increasing age in young blacks. In 126 examinations for leprosy 12 were positive. In 497 examinations of individual stools for intestinal parasites 285 were positive, the species being hookworm, ascaris, trichuris, strongyloides, schistosoma, *Entamoeba histolytica* and *E. coli*, trichomonas, and balantidium. The vaccines distributed during the year were antityphoid 57,400 cc.; antipneumococcus 34,250 cc.; antimeningococcus 25,440 cc.; antigonococcus 2,980 cc. For treatment of amoebic dysentery rivanol proved no better than yatren. 26 medical and hospital assistants took the course for certification.

A. A.

South African Institute for Medical Research. **Annual Report for the Year ended 31st December, 1929** [Lister (Spencer), Director].—84 pp. With 1 chart & 2 plates. 1930. Johannesburg.

The Research section of this report begins with plague. The organism isolated last year from the plague-like epizootic among Namaqua gerbilles (De Aar Disease) has been examined and provisionally named *Pasteurella desmodilli*; it has been isolated again from another outbreak among gerbilles, this year. Recent experiments have brought *Xenopsylla hirsuta* of the Lobengula gerbille into the list of potential plague-transmitters, and have shown that local fleas can transmit the disease from rodent to rodent. The pollens of grasses and of Compositae continue to be implicated in Hay Fever, and in connection with this troublesome malady attention is drawn to a paper by Balyeat (*Jl. Lab. & Clin. Med.*, 1927–28, Vol. 13, p. 516) on the

lurking danger of the ubiquitous orris-root powder. Search for a rapidly diagnostic skin reaction for Ancylostomiasis has been "not too encouraging." The use of cyanide sand for destroying hookworm larvae in the soil is not without promise. Hookworm larvae are stated to have survived in the laboratory in soil and in water cultures for 2 years, and eggs and larvae ingested by cockroaches have been passed alive. Since the local strains of pneumococcus are constantly changing —being replaced by "aberrant" strains—this involves the constant typing of pneumococci isolated from all referred cases of pneumococcal infection, for the preparation of suitable prophylactic and therapeutic vaccines. For similar reasons the meningococci recovered from spinal fluid in cases of cerebrospinal fever are submitted to the absorption test for grouping. Particulars and classification of the organisms thus recovered from the lungs and cerebrospinal fluid are given. Search for a filterable virus in morbid material from pneumonia cases so far has not been successful. A rare case of pneumonia, due to the Friedlander bacillus and having dark-red viscid sputum, is described. Research in tuberculosis in connexion with the Tuberculosis and the Miners' Phthisis Prevention Committees is not here described. The report on Biochemical research contains an interesting dissertation on dental caries pointing in directions where the Institute is preparing to supervise and co-operate. Progress of pathological research on Rous's Fowl Sarcoma is described.

The work of the Routine Section naturally blends at points with that separated as Research. It deals with 101,098 specimens received for examination, 78,846 being bacteriological. The diphtheria bacillus was established in 560 cases, in two cases with absence of typical clinical symptoms; during the last five years the annual percentage of positive laboratory diagnoses of the disease has gradually declined from 24·2 to 16·9. The Shiga type of dysentery infection has continued to be less frequent than the Flexner type. The Widal test is compared with blood culture in a pure and sterile ox-bile medium for diagnosis of typhoid fever. An extensive investigation with respect to the Bordet-Wasserman reaction in the various stages and forms of leprosy is still in progress. Meningococcal meningitis was confirmed in 223 cases (126 native miners); pneumococcal meningitis in 88 cases (69 miners); and a streptococcus was the causal organism of meningitis in 25 cases, several of which had an original mastoid infection; tuberculous meningitis, although not demonstrated, was presumed in a number of cases on cytological and chemical grounds. The plague bacillus was confirmed in 19 of 61 suspected cases; in two of them no recognizable bacilli were detected, but guineapigs inoculated from them developed plague. Of 1,997 rodents examined 7 had the bacillus, one of them being Cuvier's Karroo Cat (*Myotomys unisulcatus*) a first incrimination. Of suspected tuberculous sputa 27,962 specimens were examined—the largest number on record for any other year or any other disease; 4,349 showed the bacilli, about three-fourths of them from miners. Tuberculosis complicated by silicosis was present in 159 cases (91 natives); Silicosis uncomplicated by tuberculosis in 57 cases (8 natives). Pulmonary asbestosis occurred in 2 cases; and asbestosis bodies were found in the lungs of a number of cases with a history of work on asbestos mines for not more than two months. Although 1,389 specimens of serum (not necessarily suspected) were examined, only 14 were positive for undulant fever, and of these only 4 in a degree sufficiently high to warrant a serological diagnosis of the disease.

Several samples of local milk examined for *Br. abortus* and *Br. melitensis* were negative. In two chronic cases, one suggestive of influenza, the other reported to have simulated enteric, a pure culture of *Bact. faecalis alkaligenes* was obtained from the blood; in both cases a vaccine of this organism is said to have proved efficacious.

In connexion with an inquiry into the conditions of life in the Poor White class in S. Africa 526 blood-films of children of this class were examined; 65 per cent. showed a relative lymphocytosis, 30 per cent. a relative eosinophilia, 14 per cent. a relative monocytosis, and 8·7 per cent. contained malaria parasites. In about 2,056 examinations of surgical material for diagnosis, but chiefly of postmortem material from miners' phthisis cases, 403 cases of malignant tumours were diagnosed histologically, among them 40 of sarcoma, 337 of carcinoma, and 17 of melanoma.

An interesting medico-legal case is described, where ten natives became violently ill (in one case fatally) in ways suggesting an irritant poison, after eating flesh from the corpse of a calf; but *B. enteriditis* was isolated from the vomit and spleen. The ringworm fungi met with during the year were *Microsporon audouini*, *Achorion schoenleini*, and *Epidermophyton rubra*. In 1,199 stool examinations hookworm was found in 523 (Necator 3 times). Other intestinal worms found were *Ascaris lumbricoides* in 47, thread worm in 1, Trichuris in 35, Strongyloides in 3, *Taenia saginata* in 11, *T. solium* in 1, *Hymenolepis nana* in 10, *H. diminuta* in 2, eggs of *Schistosoma mansoni* in 21. Eggs of *S. haematobium* were present in 192 urines. Three Echinococcus cysts are listed. The intestinal protozoa noticed are *Entamoeba histolytica* 333 times, *Chilomastix mesnili* 164, *Trichomonas hominis* 150, *Giardia intestinalis* 160. Of 2,519 blood-films sent for examination 236 were positive for malaria, the benign tertian parasite in 145 and the malignant tertian in 91 (mixed infections of the two in 100 cases). The type and the paper and the format of the Report are a model for the official world.

A. A.

COLOMBO, Municipality of. **Report of the City Microbiologist for 1929** [HIRST (L. F.)].—*Municipality of Colombo. Report XXIV of the Medical Officer of Health, for the Year 1929.* Annexure A. pp. 38–42.

Two-fifths of this report are occupied by statistics of rat-flea surveys. The disquieting feature in the Colombo survey is the appearance of *Xenopsylla cheopis* on rats in a number of premises in a district formerly quite free from this dangerous species. Noteworthy features in the survey of grain ships in Colombo Harbour are the high proportion of *Rattus norvegicus*, and the uniformly high percentage of *X. cheopis* found both on *R. rattus* (95·63) and on *R. norvegicus* (94·95); the ships importing grain come from Rangoon, Bombay, Calcutta, and Singapore, and these facts "strengthen the importance of the ship as a link in the chain of plague infection between an export grainstore overseas and an import one in Colombo." From survey-centres in the Low Country of Ceylon it would appear that the low country "as a whole is an *X. astia* area which has so far successfully resisted penetration by *X. cheopis*." From the Up-Country survey-centres (1,600 to 6,000 feet) the evidence is in striking contrast. Here, between 1,600 and

5,000 feet, *cheopis* appears to be the prevalent flea (and is well represented also at 6,000 feet); and between 1,600 and 3,000 feet *astia* is in a fairly high percentage. On the other hand the percentage of *astia* at 5,000 feet is given as only 0·5 and at 6,000 feet is *nil*. Experiments have been pursued on the use of HCN gas for fumigating flea-infested grain, and a comprehensive report on this subject is promised. Laboratory experiments showed that fleas tend to burrow into a mass of grain to escape fumes that are diffusing slowly. The number of rodents examined for plague in 1929 in Colombo was 24,609, of which 115 were found dead, and 22 were infected. The monthly flea-index ranged between 1·27 in February and 3·38 in March.

Two morphologically distinct types of anthrax were raised from some imported goats, and at least two distinct types of colonies can be isolated from them. The practical importance of these variations is discussed. Investigations of the incidence of leptospira in the city water-supply have been continued; but attempts to exalt their virulence by successive passages through mice and guineapigs have given negative results. Investigations of the amoebae of the monkeys of the Labugama watershed have discovered trophozoites and cysts indistinguishable from *Entamoeba histolytica*, though attempts to infest kittens with them have not succeeded. Results of observations on survival of hookworm are promised in a separate report.

A. A.

SHILLONG. **King Edward VII Memorial Pasteur Institute and Medical Research Institute. The Thirteenth Annual Report for the Year ending 31st December 1929** [MORISON (J.), Director].—26 pp. 1930. Shillong. [9d.; annas 8.]

Thirteen pages of this report are statistical tables (some of which are of purely official interest) relating to hydrophobia.

Of cholera-dysentery bacteriphage 130,823 doses were distributed, its use being now established in all the principal tea-gardens of Assam. A striking instance of its efficacy was observed in an outbreak of cholera in Jakrem, a small village of 744 inhabitants. The epidemic lasted 18 days, and there were 143 cases of cholera. During the first eight days, before the arrival of the bacteriphage, there were 71 cases and 51 deaths. During the last ten days, when the bacteriphage was available, there were 72 cases; 59 of these were treated with the bacteriphage and 52 recovered, the other 13 were not treated with it and all but one died. [See this *Bulletin*, Vol. 27, p. 855.] Reference is made to the discovery by Dr. ASHESHOV (working at Patna) that a potent cholera bacteriphage is a combination of three types, each of which when isolated separately is unstable, and all of which in artificial mixture are unstable; but when isolated from a patient and cultivated all together are remarkably stable.

A. A.

RANGOON. **Fourth Annual Report of the Harcourt Butler Institute of Public Health, Rangoon, for the Year 1929** [ANKLESARIA (J. A.)].—6 pp. With 1 plan & 1 plate. 1930. Rangoon. [As. 6; 7d.]

This short Report states that the Institute has had a busy year and that its activities are expanding. Its greatest need is still a whole-

time Director, but the proposal to recruit a public health analyst has been sanctioned. The flea survey of Rangoon has been completed and a rat survey has begun. Malaria surveys have been started, experiments with mosquito larvicides have been continued, and in this connexion an investigation of the Cyprinodont fishes has been made. In the laboratories the main lines of work have been chemical and bacteriological examinations of waters, analysis of food (particularly of ghee and ngápi) and other condimenta, and analysis of cinchona products and other drugs. Sensitized antidysenteric vaccine has been prepared and issued to three jails in Burma, its early trial having shown a 50 per cent. reduction in the incidence of the disease among the inoculated.

A. A.

FEDERATED MALAY STATES. **Annual Report of the Institute for Medical Research for the Year 1929** [KINGSBURY (A. Neave), Director].—*Federated Malay States Ann. Rep. Med. Dept. for Year 1929.* Appendix I. pp. 51–107.

The Report begins with an excellent review of a very thorough investigation of 164 cases of tropical typhus, of which 139 occurred in a certain class of Tamils on an oil-palm plantation near Kuala Lumpur. Some of this work has been noticed already (this *Bulletin*, Vol. 27, p. 372). The morbid anatomy, histopathology, the transmission to laboratory animals, the serological reactions, the bacteriology, epidemiology, and the sources and transmission of infection are described or re-described. In serial cultures (by methods similar to those employed in European typhus) the virus from man, Gram-negative and pleomorphous, appears in three types, slender fusiform bacilli (or maybe minute cocci or diplococci), " Rickettsia," or " diphtheroid," and in virus from inoculated laboratory animals as coccoid, diplococcoid or diphtheroid in form. As previously stated, the disease on the oil-palm plantation attacked in particular Tamil coolies handling the decaying flowers of the palm and the soil around the trunk of the tree ; these facts suggested a careful examination of the arthropod fauna infesting the exuviae of the palm, the rats of the plantation, and ultimately of the coolies coming straight from pruning the palm trees. The issue was the discovery, among the 21 species of ectoparasites of 660 rats from Kuala Lumpur and the oil plantation, of 5 new species of Trombidiid larvae, and (very common on rats from the plantation) *Trombicula deliensis* ; and, among the ectoparasites taken (in the course of three months) from 464 examinations of pruning coolies, of 88 arthropods the majority of which are larval Trombidiidae. (*Trombicula akamushi* was found to be the commonest mite parasitic on men in the course of this work.) Infection, as shown by lesions and by microbes strikingly like those found in experimentally infected guineapigs, was also discovered in some of 80 rats collected in the plantation. Although the infection has also been transmitted to laboratory animals by the head-louse and the body-louse (from an imported stock) and by cultures isolated from human patients, it is not supposed, in the face of the accumulated evidence from the oil-palm plantation, that lice are the necessary means of intervention.

In Malaria the results of investigations undertaken to determine the factors that influence the infectivity of gametocyte-carriers to

Anopheles maculatus (one of the principal carriers of the infection in the country) are described and tabulated; with *P. falciparum* it is estimated that one gametocyte per 200 leucocytes is probably the lowest limit at which the blood of the patient is infective for that species—an estimate requiring more time for accurate determination by thin smear than hospital practice could afford. Other problems investigated are the value of quinine in the epidemiology of subtertian malaria; the proportion of subtertian cases infective to mosquitoes; and the relative incidence of albuminuria among benign tertian, subtertian, and quartan cases. Systematic observations showed *A. maculatus* to be the dominant anopheles in a growing rice-field; that more individuals of the species were caught in a trap outside the coolie-lines than in the lines; and that in the course of 1,895 dissections of anopheline caught through the year only one, a *maculatus*, was found infected.

Attempts to infect *Macacus cynomolgus* with material from acute cases of Leprosy by inoculation, by inhalation, and by ingestion were unsuccessful. In eight cases treated, "solganal" (containing 36·5 per cent. of gold) appeared at first to have a beneficial effect on this disease and did not induce the leprous reaction. Experiments on the diagnosis-value of a C.F. test, and observations on the results of routine Wasserman and Kahn tests and the influence of antisyphilitic treatment in leprosy are described. Several cases of Leptospirosis in Europeans, contracted by bathing in a public pond, are discussed, and short abstracts of 3 fatal cases in Chinese (2) and Tamil coolies in which the obvious lesions found p.m. were extensive lesions of the liver, some degenerative changes in the kidneys, and various congestions and entravasations. Two severe cases of Tsutsugamushi Fever in European planters came under observation. An investigation of the Anaemia of pregnancy, a condition similar to that described by Balfour and McSwiney as occurring among all communities in India, has been started. Brief abstracts of some cases of Amoebic dysentery treated with "rivanol" conclude with "therapeutic value in amoebic dysentery negligible." Sixteen cases of a painful condition known as Burning Feet, said to be long known among Indians in other parts of the world, have been under observation; it is regarded as a deficiency disease; all the patients were natives of Southern India. In the treatment of Yaws "halarsol," in comparison with novarsenobillon, appeared the more effective, but intramuscular injection caused extensive hard and painful swellings. An investigation of local Pneumococci has begun. Sawah itch, prevalent in Tampin district of Negri Sembilan, is ascribed by the natives to certain snails in rice-fields; search has revealed several species of cercariae in the snails, but so far nothing more.

The accommodation and ménage of the Vaccine Lymph Department has undergone some improvements. Buffalo lymph is used for human vaccination, buffaloes being inoculated with calf lymph which when necessary is rejuvenated by passage through rabbit. The technique of preparing the animal, collecting pulp, and preparing, storage, etc., of lymph follows that practised in Java.

Of liquid extract of rice-polishings 22,333 fl. oz. were issued.

A list of 32 organisms isolated from local water-supplies is given; 751 colonies have been isolated and tested for biochemical reactions.

The Division of Bacteriology deals with routine—serological reactions, prophylactic vaccines, record of bacteriological examinations, water examinations, milk, etc.

The Division of Pathology also supplies the results of anti-rabies treatment (Semple's). Cases treated, 203, none fatal ; all cases bitten by dogs, except 2 contacts with rabid calf. (Two fatal cases are recorded, but neither had sought treatment.) Of 165 animal brains sent for examination 72 were positive. 1,328 dogs were inoculated, and 14,857 cc. of canine antirabies vaccine were supplied to the Veterinary Departments ; for this vaccine buffaloes were used, being inoculated by the intracerebral route with passage virus.

Among 641 specimens received for diagnosis or obtained at autopsies were 41 cases of benign and 122 cases of malignant tumour ; the latter including carcinoma (in variety), adenocarcinoma, epithelioma, endothelioma, fibrosarcoma, sarcoma (in variety), melanotic sarcoma, lymphosarcoma, myxosarcoma, teratoma, rodent ulcer, and Hodgkin's disease, and the patients in numerical order Chinese 64, Tamil 31, Malay 17, Sikh 2, Javan 1, also 6 European and 1 Eurasian.

The Divisions of Chemistry and Entomology deal with routine.

A. A.

Geneeskundig Tijdschrift voor Nederlandsch-Indië. 1929. Vol. 69. No. 7. pp. 653–663.—Uit het Jaarverslag van het Militair Geneeskundig Laboratorium over het jaar 1928. [**Annual Report of the Military Hygiene Laboratory for the Year 1928.**]

The greater part of the report is occupied with a detailed enumeration and analysis of routine examinations. The total number of these examinations was 16,909, apportioned as 5,153 to the department of tropical pathology, 4,124 to parasitology, 7,285 to bacteriology and 347 to pathological anatomy. Two publications have issued from the section of tropical pathology on (1) Pyomyositis tropica and (2) Blood destruction in chronic malaria and other splenomegalies. In the parasitology section researches on blood grouping were continued and in the bacteriological section an investigation into the sterility of emergency dressings soaked in methyl violet was completed.

W. F. Harvey.

Geneeskundig Tijdschrift voor Nederlandsch-Indië. 1930. Oct. 1. Vol. 70. No. 10. pp. 1002–1016.—Jaarverslag van de Landskoepokinrichting en het Instituut Pasteur te Bandoeng over 1929. [**Annual Report of the Vaccine Establishment and the Pasteur Institute at Bandoeng in 1929.**]

The report summarizes the activities of the institutes, dealing in detail with the production of smallpox vaccine and with antirabic treatment.

Over 23 kgm. of active vaccine was produced, of which was issued a quantity sufficient for over 10 million vaccinations. As far as they were controlled (1·3 million) 97·5 per cent. of the vaccinations were successful.

Antirabic treatment was administered to 980 patients (156 Europeans and 824 natives). Since for a number of patients it could be proved subsequently that the cure was or had been superfluous, the number of patients who rightly underwent the course was 738. Rabies broke out

notwithstanding this treatment in 10 cases (1 European, 9 natives), in all within 30 days from the commencement of the cure.

18,797 pathological specimens were examined for diagnostic purposes.

W. J. Bais.

Geneeskundig Tijdschrift voor Nederlandsch-Indië. 1930. Sept. 1. Vol. 70. No. 9. pp. 876–896. [15 refs.].—Uit het jaarverslag van het Geneeskundig Laboratorium over 1929. [**From the Annual Report of the Medical Laboratory (at Weltevreden) in 1929.**]

Most of the subjects dealt with in this report are already published elsewhere. Yet some items may be quoted.

Experiments with mature larvae of *Dracunculus medinensis* in the local Cyclops species, fed to a monkey last year, resulted in infection of the animal with Dracunculus as shown by autopsy.

Alteration of the technic of the Wassermann test as proposed by Gross (*Klin. Wochenschr.* 1928) proved to yield results which did not compare favourably with those of the routine technic of the laboratory. Various flocculation tests (Meinicke's M.T.R., Kahn's test, Müller's "Ballungsreaktion") yielded favourable results but are to be submitted to further observation.

Subdivision of the non-toxic type of dysentery bacillus was abandoned as the subspecies proved not to possess fixed characteristics.

No satisfactory data are available yet as regards the protective action of the purified anti-beriberi vitamin prepared and delivered by the laboratory. The quantity issued showed an important increase in comparison with 1928. Administered subcutaneously the pure vitamin has no by-effects such as may be brought on by the not absolutely pure preparations and which also occurred in animal experiments with the Japanese preparation "Oryzanine."

W. J. Bais.

Wolff (J. W.). Jaarverslag van het Pathologisch Laboratorium over 1929. [**Annual Report of the Pathological Laboratory.**]—*Meded. Path. Lab. t. Medan-Sumatra.* 1930. No. 8. 41 pp. With 6 charts.

Most of the report is occupied with the usual description and tables which set out the nature and extent of the laboratory's activity. Of general interest is the description of a case of tropical typhus with strongly positive Weil-Felix reaction, followed six months later by Kedani mite (Tsutsugamushi) disease. In the course of this second infection the Weil-Felix reaction disappeared, only to reappear with convalescence. The case is an important one and is held to substantiate the view that while tropical typhus and Kedani mite disease are closely related affections they are not identical nor does one give rise to immunity against the other.

The figures relating to the possibility of replacement of the Wassermann reaction by the Sachs-Georgi or the Kahn tests are also interesting. Out of 14,249 trials the Sachs-Georgi proved to give a greater or a less reaction than the Wassermann 2,027 times or deviation of $14{\cdot}2 \pm 0{\cdot}28$ per cent., while the Kahn differed 478 times out of 6,814, a deviation of $7{\cdot}0 \pm 0{\cdot}3$ per cent. A great advantage of the Kahn

reaction is the ease with which it can be read to the exclusion of doubtful reactions. The Kahn reaction is evident earlier in syphilitic infection and remains longer positive in treated cases than the Wassermann reaction. It has accordingly been decided to drop the Sachs-Georgi test and use only the Wassermann and Kahn reactions.

W. F. Harvey.

British Guiana. **Annual Report of the Government Bacteriological Department for the Year 1929** [Steven (Geo. H.)].—*British Guiana Rep. of the Surgeon General for the Year 1929.* Appendix I. pp. 66–70.

In the course of routine 820 examples of faex were examined; evidence of ascaris was found in 21, of hookworm in 193, of whipworm in 10, and amoeba-cysts in 5. In 208 cultures of faex *Bact. typhosum* appeared in 18, and *paratyphosum A* and *C* once each, *Bact. dysenteriae* Shiga once and *Bact. dysenteriae* Flexner four times. In 232 urines albumin in excess of 0·05 per cent. was present in 79 cases. In 149 autopsies of Africans (negro and mixed) there were 6 cases of carcinoma of viscera. Cases pointing to cardiac failure as the probable cause of death amounted to 20 per cent. of all autopsies of all races (252), degeneration of the myocardium, and dilatation of the right side (with or without hypertrophy of the left ventricle) being very common features, especially in East Indians. Disease of the kidneys was evident in 19 of 252 autopsies, apart from the fact that in one term of ten weeks (May–July) 21 deaths were registered as nephritis without any laboratory or post-mortem confirmation.

A. A.

MALARIA.

JAMES (S. P.). **Some General Results of a Study of Induced Malaria in England.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1931. Mar. 13. Vol. 24. No. 5. pp. 477–525. With 7 charts, 3 graphs, & 6 figs. on 1 plate.

These observations were made at the Horton Mental Hospital, Epsom, by Colonel James and his colleagues, Dr. W. D. NICOL and Mr. P. G. SHUTE, during the treatment of general paralysis and some other mental diseases by induced malaria. More than 3,000 patients certified under the Lunacy Acts were treated, with the result that nearly 20 per cent. were discharged to their homes. By the method now employed, the malaria is not cut short by quinine, but it is allowed to smoulder. No quinine is given, or only just enough to control the infection and, in half the cases, spontaneous cure of the malaria results. It is surprising how very few malaria patients are infective to anopheles; for example, eight batches of *A. maculipennis* were fed on patients with quartan gametocytes in their blood, with the result that though zygotes appeared in the stomachs of a small number, none contained sporozoites in their salivary glands or proved infective when allowed to feed. In the case of malignant tertian, seventeen feeding experiments at Horton were all negative, and among five selected cases in Rome there was only one good infector. Moreover, the "apparently healthy carriers" of benign tertian—with freedom from fever but not from parasites—always gave negative results when mosquitoes were fed upon them. DARLING stated that at least one gametocyte to every 500 leucocytes was necessary to render blood infective for mosquitoes, but it was found at Horton that the number of gametocytes which exflagellated, and the time required for the process, was a much better indication of infectivity. Benign tertian blood which contained fewer than one exflagellating male to 1,000 leucocytes, after 15 minutes in the incubator at 25° C., always failed to infect *A. maculipennis*. All the male gametocytes in the blood of good infectors exflagellated within 15 minutes, in moist chamber preparations kept at 25° C.

This refers to benign tertian; in experiments with *P. falciparum* and *P. malariae*, the presence of numerous exflagellating gametes did not prove a sure sign that maculipennis would become infected. C. W. DANIELS and also B. MAYNE found that by repeatedly feeding a batch of mosquitoes on an infective patient they increased the proportion of infected insects, but this was not apparent at Horton. Individuals of the same species of anopheles varied greatly in their receptivity to infection; some appeared to be refractory. There is some evidence that the endothelial lining of the stomachs of such refractory individuals is less permeable to the vermicules than usual. It is possible that a race of anopheles might arise which would be difficult to infect because of this anatomical peculiarity, and this may sometimes be the reason why a given species is a good carrier in one country, but a poor one in another. Batches of *A. maculipennis* fed on a case of benign tertian and kept in a bedroom in England, during July and August, took 15 days to become infective in two experiments, and 23 days in a third. Control batches in the incubator at 76° to 80° F., dry bulb, and 74° to 78° F., wet bulb, showed sporozoites after 9 days. Feeding on raisins was not deleterious to zygote production or development. BARRAUD'S cages were used for transport [see this *Bulletin*, Vol. 27, p. 300].

The numbers of zygotes varied so much in different individuals of a batch that it was concluded that the average number would be of little use for comparing the relative carrying-power of different species. The average quantity of blood taken by an English *maculipennis* was found to be 1·8 milligrams, approximately 1·73 cmm. Investigations made during a period of seven years showed that, in April and May, less than 10 per cent. of the anopheles lived to become infective; during the period August to September, on the other hand, about 50 per cent. survived and became infective. "It is obvious that from the point of view of the spread of malaria, a great abundance of adult *maculipennis* in April and May is much less important than is a scanty prevalence from August to September."

Colonel James does not agree that the presence of sporozoites in the salivary glands of a mosquito, immediately after it has bitten, necessarily means that sporozoites have been injected; he points out that, for this, they must be lying free in the salivary duct at the time of biting, and he attributes many of the failures to non-injection of sporozoites. Of the remaining failures (18 per cent. of all those bitten) some were latent infections, some were so anaemic that their blood was not a good medium for the parasites, and in others the dose of sporozoites may have been too small. In none of the failures was there any reason to suppose that the patient's blood contained immune bodies. In patients who have had previous attacks, on the other hand, an immunity may develop; after there has been a "recurrence" followed by spontaneous recovery without quinine treatment, endeavours to reinfect with the same parasite always fail. Immunity to *P. vivax*, however, does not protect against *P. falciparum* or *P. malariae*; nor does immunity to one strain of *P. vivax* protect (or it only partially protects) against other strains of the same species. (See Ciuca *et al.*, *ante*, p. 119.) Colonel James pleads for the study of immunity in individual children, in a hyperendemic area; starting with the newly born and continuing until the age of natural immunity is reached.

The incubation in patients infected with benign tertian varied within somewhat wide limits. In first infections, caused by mosquito bites, the mean period was 14·1 days; but 11·2 days when caused by blood inoculation. In subsequent infections, the periods were 18·1 and 18·7 days, respectively. There was a tendency for the incubation to become shorter (and—in subtertian malaria—for the attack to be more severe) as the number of bites was increased. In about 3·5 per cent., the incubation was as short as 8 days and, in about the same proportion, it was as long as 25 days. In addition, there were several latent cases, in most of which the incubation period was between 30 and 40 weeks. Attention is called to the duration of this latent period because, in ordinary cases, "a peculiar character of benign tertian malaria is liability to a return of fever and parasites at an interval of between 30 and 40 weeks after the date of the first infection by mosquitoes." For convenience sake Colonel James defines a Recrudescence as a return of fever and parasites within 8 weeks of recovery from the primary attack; a Relapse, as a return between the 8th and the 24th week; a Recurrence, as a return later than this. About half the patients suffered from one or other of these manifestations. Some patients were of a "refractory type" difficult to infect, but, provided a patient had not had a previous attack, there were no failures to infect though sometimes three or four attempts were necessary.

Malignant tertian malaria was transmitted to three patients by the bites of mosquitoes. Details of one case are given as an example of "the ineffectiveness of quinine during the early stages of a malignant tertian fever." The patient, a woman who had never had malaria before, was bitten several times by mosquitoes infected in Rome. Beginning on the third day of the attack, when there were 20 parasites in 100 fields, the patient was given quinine in adequate amounts—the average daily dose was 27 grains—but, after 13 days of this treatment, the fever continued, and the parasites increased. The temperature came down on the 15th day, the parasites disappeared the next day and quinine was stopped. Three days later, there was a recrudescence which was again treated by quinine—24 grains a day, divided into two-hourly doses—but again it failed, for, after 9 days, the patient still had fever, and it took a fortnight to clear the blood of parasites. [SINTON, see below, p. 596, found no instance of quinine resistance among 3,700 patients.]

The tendency of recurrences to appear after an interval of 40 weeks, and of latent infections to have an incubation period of a similar duration, explains the "spring rise" of malaria in northern Europe which "is due to recurrences in persons who had their primary attack in September, together with primary attacks in persons whose infections in September remained latent through the winter." As regards quinine prophylaxis Colonel James considers that it is a method for which no general rule can be prescribed, and that it may be of use in the case of persons engaged on temporary urgent work, such as troops in the field. Quinine given to patients just before and just after the *direct inoculation* of infective blood prevents the development of infection, because the trophozoites are destroyed; but it is ineffective when given during the incubation period, *in cases infected by mosquito-bites*, because it has no action on the sporozoites injected by the mosquitoes. Though it does not delay the onset of the fever it delays the appearance of parasites, and so it is harmful because it thus delays diagnosis. Experiments at Horton showed that if persons who are subjected to mosquito-bites continue to take daily prophylactic quinine, after the incubation period, they suffer from repeated mild attacks of fever at irregular intervals, and, if the daily dose is neglected, they go down with a frank clinical attack within a few days. Fifteen grains once a week was not so effective as 5 grains a day. Regular quinine-takers gain little or no immunity, and hard work or exposure to the sun may bring them down with a severe attack.

Long interval relapses and recurrences do not occur in patients infected by direct blood inoculation, but they occur in 50 per cent. of those infected by mosquito bites. The sporozoites injected in the latter case differ from the trophozoites injected in the former, because they have lived in the tissue cells of the mosquito. It has been suggested that sporozoites enter the red blood corpuscles, where they are sheltered, while merozoites merely attach themselves to the surface. Another theory is that some of the sporozoites enter the cells lining the blood vessels where they remain until the cells break down, months later.

Colonel James does not agree with the generally accepted view that primary attacks are more easy to cure than late manifestations. Europeans who take quinine at the beginning of an attack acquire no immunity, but, in untreated cases of benign tertian, among natives in the tropics, a few small doses of quinine suffice to cure the attack,

because they reinforce a developing immunity. He thinks that the frequency and severity of relapses in benign tertian depend upon the amount of immunity acquired during the primary attack. If quinine is withheld until nearly the end of the attack, immunity is allowed to develop and relapses are rare; "our patients whose treatment with quinine has not been begun until their attack or recrudescence is about to terminate 'spontaneously,' or has actually so terminated, remain free from further manifestations."

When testing the therapeutic efficacy of drugs, the test cases and the controls should be patients at similar stages of their primary attacks. In 32 out of 43 cases of benign tertian at Horton, one dose of 5 grains of quinine, given when the attack had lasted 7–10 days, caused a temporary cessation of fever and a disappearance of parasites which lasted for a period approximately equal to the incubation period of the primary attack. By this method it was ascertained that quinine is more effective in benign tertian than in quartan, and more effective in quartan than in malignant tertian; in malignant tertian, 5 grains of quinine is not sufficient to modify the fever sufficiently to enable the therapeutic course to be continued without risk. The efficacy of drugs may also be tested by an application of the method which Roehl has used in bird malaria. What is needed in order that this test may be employed usefully in blood-infected human malaria, is that the dosage of quinine should be worked out which will delay, but not entirely prevent, the clinical attack from developing.

W. Fletcher.

Hackett (L. W.) & Missiroli (A.). **The Natural Disappearance of Malaria in Certain Regions of Europe.**—*Amer. Jl. Hyg.* 1931. Jan. Vol. 13. No. 1. pp. 57–78. [17 refs.] [Malaria Experim. Station, Rome.]

Malaria has practically disappeared from certain regions of Europe in recent times without any intentional effort to dislodge it, and in spite of the continued presence of anophelines in numbers far superior to those of regions still intensely malarious. Such areas are usually well-defined zones in the heart of malarious regions and differ in this respect from that extensive borderland at the northern limit of malaria distribution—England and Holland for example—from which benign tertian seems to have been gradually receding in the course of the last century. Such malaria-free zones are Valdichiana and Massarosa, in Tuscany. Anopheline immunity to malaria is not the explanation of this freedom: *maculipennis* from Massarosa can be readily infected in the laboratory, and they are, in fact, regularly gathered and brought to Rome for use in the experimental transmission of malaria for therapeutic purposes and for infection experiments. Nor is the freedom from malaria due to the elimination of gametocytes through the effective treatment, or enhanced natural resistance, of a prospering community. The gametocytes in a malarious population have never been successfully reduced by treatment, or otherwise, to such a point that transmission can no longer take place in the presence of a sufficient number of anophelines. The severe epidemics which follow an unusual invasion by mosquitoes of an area which has been malaria-free for years, show that gametocytes are never absent in such places when they are oases in a generally malarious region. For example, Nemi in the province of Rome has never been malarious, there have never been sufficient

anophelines to insure transmission ; yet, when Lake Nemi was lowered 14 metres to reveal the sunken barges of Caligula, mosquitoes bred on the exposed flats and there was a severe epidemic of malaria, showing that there are apparently always enough gametocyte carriers in a town of this sort to start an epidemic. In certain rural areas of Spain, Sadi de BUEN reports that, in spite of a zero parasite index in December, an epidemic may occur in the summer. " We can no longer consider even a negative parasite index as an indication that anophelines may be allowed to increase in number without danger to the community."

The authors find the answer to the question of " anopheles without malaria " in the lack of contact between mosquito and man. Investigations were made at a small, isolated farmhouse, known as " Casa Bonifica," close to the marshes, in the malaria-free zone of Massarosa. On the ground floor, there were living rooms and a stable containing three cows and a calf ; upstairs there were four bedrooms. There were always many *A. maculipennis* in the stable, but only a few in the bedrooms. On a certain day in the middle of the malaria season, there were 1,626 anopheles (2 per cent. males) in the stable, but only 57 (11 per cent. males) in the bedrooms ; moreover, it was shown by precipitin tests that only three of all the mosquitoes had fed on human blood, while some 1,300 had fed on cows, a ratio of more than 400 to 1 ; which may be called the stabular attraction of the locality. Five farms in the intensely malarious Pontine Marshes were searched for *A. maculipennis*, by way of comparison, with the result that 242, or 39 per cent. of the total catch, were taken in bedrooms and only 372 in stables. Precipitin tests showed that 11, of the 93 females which had bitten, contained human blood, and the rest animal blood. This is an efficient stabular ratio of lower than 8 to 1, and it was associated with severe epidemic malaria, though the bedrooms were large and lofty while the stables were dark, humid and free from draughts. In other places in Italy, well known for freedom from malaria associated with an abundance of anopheles, the same high stabular ratio was found as in Massarosa. Visits to the Dombes district in Southern France (see MARCHOUX, this *Bulletin*, 1930, Vol. 27, p. 194) indicated an even higher stabular attraction.

By way of experiment, the cows at Casa Bonifica were moved into a white tent, put up at the end of the house, and men took their places in the cow-shed. The anophelines now swarmed in the tent, but very few visited the cow-shed after clean straw had been put down. When cow-dung was put into a bedroom, anopheles were attracted into it, but did not bite the men sleeping there. In the zones where malaria has greatly diminished, in spite of the continuous presence of *A. maculipennis*, the quantity of anopheles is much greater than in malarious zones, but they do not feed on man. Such regions are also characterized by intensive cultivation and large numbers of domestic animals. The hypothesis is advanced that those anophelines born with a preference for animal blood have prospered and multiplied to such an extent that they have ousted those with a preference for human blood, since the total number of *A. maculipennis* produced is fixed by the amount of water suitable for breeding. In support of this hypothesis, RAFFAELE, in the authors' laboratory, has developed two strains of *Culex pipiens*, in eight generations, one of which will eagerly attack canaries, while the other will starve to death in the presence of these birds. Other strains of *C. pipiens* occur in nature which will not touch human or avian blood, but feed only on reptiles. The authors

did not find any anatomical differences between the zoophilic and homophilic strains of *A. maculipennis*. They do not believe that the type of building, in Southern Europe, has much influence on the number of anopheles. In a highly malarious region, like Fiumicino, in Tuscany, *A. maculipennis* will try to enter the bedrooms of the new houses in the settlement built for ex-service men, neglecting the unscreened cow-sheds; in malaria-free Tuscan Valdichiana, on the contrary, no *A. maculipennis* are found in the badly lighted, ill-ventilated rooms of the ancient and massive medieval farmhouses, in which a previous generation suffered from malaria, in spite of the fact that these anopheles are far more numerous in Valdichiana than in Fiumicino, and they swarm in the cow-sheds. It is the presence of a certain kind of food supply which, by instinct, attracts certain races of mosquitoes. " The numerical predominance of the zoophilic strain must be almost absolute to eradicate malaria . . . an efficient animal barrier cannot be improvised about a human dwelling. Protection from malaria by domestic animals rests on a process of biological selection, and not on the chance that the mosquito will bite an animal instead of a human being."

W. F.

League of Nations. Health Organisation. **Malaria Commission. Report of the Malaria Commission on its Study Tour in India (August 23rd to December 28th, 1929).** C.H./Malaria/147. L.o.N.P. III. Health. 1930. III. 9.—77 pp. With 1 map & 46 figs. on 11 plates. Geneva. 1930. Aug.

The following members of the Commission took part in the tour: W. A. P. Schüffner, N. H. Swellengrebel, Louis Williams, S. de Buen, M. Peltier, and M. Ciuca. Their report is prefaced by A Note on Malaria Research and Prevention in India, written by Colonel Christophers, which is particularly valuable because it contains his views on India's malaria problem.

" The great mass of India, with its population of 319 millions, nearly one-fifth of the population of the whole world . . . comes under conditions which may be described as a varying but often moderate endemicity. Further, 90 per cent. of this population is living under rural conditions [barely 7·8 per cent. can read or write]. This vast illiterate teeming mass of humanity, living in 687,935 towns and villages, is the real malaria problem of India. . . . Many of the villages have a considerable population, say from two to five thousand. Roughly speaking, no funds are available other than will just serve the needs of conservancy, etc. . . . In the vast bulk of the population is the conservative spirit of those whose ancestors have always lived as they have—communities whose combined resources are woefully small—so poor that they practically cannot be taxed in the western sense, lacking in public spirit, with a tremendous amount of ignorance and apathy, having no ' health conscience ' or even any adequate appreciation of what is in the mind of the sanitarian who may attempt to rouse their enthusiasm in such cause. Education in hygiene, not malaria prevention, is the only outlook one can see at present to this vast problem of rural sanitation. Schools, . . . , travelling dispensaries, district health officers . . . a hundred and one methods, but not yet anti-larval operations. . . . Malaria prevention for plantations, industrial concerns, towns and cities and many other circumstances is one thing, a claim that rural malaria in India ' is preventable ' and therefore why not ' prevented ' is simply a quibble of ignorance."

The Commission, in their Introduction, draw attention to the fact that owing to the variety of conditions it is impossible for the Central Government to institute a general scheme of anti-malaria control. The number of civil surgeons is so small and their duties are so heavy, that even by working twelve hours a day and spending only two hours in each village in their district, they would need two or three years to get round them.

In the provinces the mortality from fevers, most of which are attributed to malaria, is higher than from any other disease: 48 per cent. of all deaths in Mysore, 40 per cent. in West Bengal, 32 per cent. in Central Bengal. The death rate is based on figures compiled on the village Chaukidar system. The village watchman, or Chaukidar, goes once a week to the police-office of the headquarters of the Thana (or sub-district), and recites what he remembers of the last week's births and deaths, including the cause of deaths according to his own views; he is usually illiterate and cannot fill in the register himself. The Commission "considers it to be one of the primary duties of the Government to arrange for adequate medical assistance." In rural areas quinine can be obtained at the dispensaries, police-stations, post-offices, schools, etc., but "in the absence of any further organisation . . . this may be pronounced insufficient . . . adequate quinine distribution cannot stop at ensuring the presence of a sufficient quantity of quinine in every village. . . . *Without quinine distributors, quinine distribution is almost useless.*" The Commission are of opinion that quinine distribution and all rural medical assistance should be undertaken by the Public Health Department, leaving only the large hospitals in the cities to the Medical Department. This would give the Public Health Department a stronger hold on the population, which is at present not sufficiently educated to appreciate prevention of disease. "*A rural public health department in India should cure and should therefore discharge likewise the functions of a medical department. The distinction between these two departments, perhaps suitable for European conditions, appears to us wrong in principle in India.*" (Compare GIGLIOLI, *ante*, p. 131.)

The four chief local malaria problems are: A, the urban; B, the Punjab; C, the Bengal delta; and D, the hill malaria problem. These are dealt with seriatim.

A. Malaria in the cities. This is due to *A. stephensi*, which breeds in wells inside houses and in closed cisterns on the house-tops. These mosquitoes do not need to leave the house to deposit their eggs and are therefore domestic, both in their adult and larval stages. That this knowledge, due to BENTLEY and COVELL, has yielded so little result in Bombay and other cities is partly due to religious opposition and partly to the lack of co-operation between the four main governing bodies, namely the city corporation, the port trust, the railways, and the provincial government. "If the people and the local boards in the city of Bombay could set aside personal feelings, political animosities and religious scruples, and could combine to drive out the enemy from a position that has only been tenable through mutual discord in the attacking force, we believe that a moral impetus of no mean value will be given to the rest of India."

B. The Punjab problem. This could hardly be called serious were it not for occasional outbreaks of terrible and widespread epidemics sweeping over the whole province. It is probable that these epidemics

take their origin in various localities where malaria is always highly prevalent; but whether these permanent foci are due to a greater accumulation of *A. culicifacies* is a matter which requires much more investigation. If the persistence of malaria in such places is due to a high anopheline density, it may be possible to attack the problem by anti-larval work limited to these endemic foci. The western part of the Punjab was a desert until it was irrigated by huge canal systems. During heavy monsoons the land is often flooded, an unmitigated calamity to the wheat and other dry crops grown in the country. Irrigation has raised the level of the subsoil water, the flood water cannot get away and the soil becomes water-logged. The numerous permanent collections of water in these areas provide breeding facilities for *A. culicifacies*; moreover many of the water-logged areas are thrown out of cultivation by the formation of deposits of mineral salts (see McCombie YOUNG, *ante*, p. 106). The epidemics which follow floods are not, according to GILL, due to an increase of anopheles, the density and distribution of which remains constant, but to (1) the length of time since the last epidemic, with proportionate diminution of immunity of the population; (2) adverse economic conditions caused by floods, especially if following lean years of drought; (3) increased humidity prolonging the life of anopheles and rendering them better transmitters.

C. The Bengal Delta. This is a wet crop country growing rice, cane and jute. The eastern part of the delta is healthy, the western part is malarious. In the healthy part, the rice grows in swamps with water rushing through them from the rivers, full of rich fertilizing silt which it deposits when the rains are over. In the unhealthy parts there is plenty of water, but it comes from dead rivers and tanks; it is not running water, it carries no fertilizing silt, the crops are poorer, and the economic conditions are less satisfactory. The water is stagnant and grows many weeds which provide edge for mosquito breeding. BENTLEY'S theory is that the absence of malaria in eastern Bengal is due to the circulation of silt-laden river water. A century ago, the fields in western Bengal were as healthy as those in the east, but in those days the dead rivers were maintained as irrigation canals, and they carried silt-laden flood water. Nowadays, owing to changes in the administration of taxation, these canals are no longer kept open, and they have been still further blocked by roads and railways which keep the fertilizing flood water off the land. Anopheles (*A. philippinensis* and *A. minimus*) are as plentiful in one district as in the other, but while their maximum prevalence coincides with the malaria season in the unhealthy west, it occurs much later in the healthy east, because anopheles will not breed in the flood water until it has become clear of silt, after the rains and the malaria season are over. BENTLEY'S scheme is to re-establish the old system of irrigation, by dredging the canals and removing obstructions; no special anti-larval measures are needed; it will not prevent anopheles breeding, but will render them harmless. RAMSAY (this *Bulletin*, 1930, Vol. 27, p. 637) found a similar problem in Assam, where *A. minimus* is as numerous in the healthy low-lying plains, at the foot of the hills, as it is in the malarious tea-estates at a higher level. Here again, the peak of anopheline density coincides with the malaria season in the unhealthy hills but not in the healthy plains. In the winter, when the rains are over and the water in the plains is clear, *A. minimus* breeds more abundantly there than in the hills, but when the rains come and the low country is flooded

with silt-laden water, the mosquitoes disappear from the plains and are abundant in the hills. Why the anopheles do not transmit malaria when breeding in their winter resorts in the plains of southern Assam is just as incomprehensible as why *A. philippinensis* and *A. minimus* do not transmit malaria during November in eastern Bengal.

D. Hill malaria. The streams in the hills proper, which may be rushing torrents in the rains, run quite dry when they are over, or leave seepage and pools. In the gently sloping area of the foot-hills, the streams slow down, and follow a meandering course in deep ravines with wide beds, usually in light soil, forming frequent swamps. The foot-hills of the mountains are sparsely populated, the soil is rich, and they are often suited for growing tea; therefore they invite immigration. In the United Provinces, Rohilkand, and north-west Bengal, the foot-hills are known as the Terai; in north-east Bengal a similar area is called the Duars.

"Malaria in these areas appears in its worst form, if the immigration is not accompanied by adequate medical and economic measures. . . . In the Rohilkand Terai . . . the spleen rate is almost everywhere over 90 per cent. . . . and a general mortality of almost a hundred, against a birth rate of half this figure, quickly wipes out one village after another, so that the average lifetime of each village hardly exceeds ten years. . . . Conditions greatly improve if the immigrant population is well-housed, well-fed, well-cared for medically and sanitarily, even without any special anti-malarial precautions. With the latter, many a 'death-trap' has been changed into a health resort." (See CLEMESHA, below, p. 576.)

A. listoni, *A. minimus* and *A. maculatus* are the principal vectors; they require clear water without silt, not too densely shaded. They must be very potent carriers, because they maintain a high spleen rate though they are usually present in only small numbers. Here is an unsolved problem; one would expect an unusually high infection rate among them, but this is seldom found.

The Report deals next with the control of malaria in agricultural, industrial and military centres. Mian Mir, now known as Lahore Cantonments, was visited by the Commission, and their remarks on the original anti-larval operations are full of interest. They were convinced that if these operations had been still in progress at the time of their visit, Mian Mir would have been shown to them as a successful piece of work. "What Mian Mir showed was that this kind of work as carried out by Christophers and James cannot be done cheaply and easily and that, as soon as it is stopped, the results are quickly lost. We do not believe that recent anti-larval work carried out under similar circumstances has in any way disproved the lesson of Mian Mir." The Public Health Department in Bengal has founded an experimental station in the tea-garden Meenglas (Duars), where all the streams are converted into subsoil drains for a radius of half a mile from the cooly-lines, and for half a mile further they are oiled. Local opinion holds the results to be satisfactory, a reduction of 40 to 70 per cent. in the spleen rate having been noted since 1917. "Unfortunately, these results are not constant, as our own examination showed a spleen rate of 89 per cent. among the children." On the other hand, the anti-larval work carried out by RAMSAY in Assam has reduced the spleen rate on his estates from 70 to 10 per cent. The Commission, with their experience of far-flying anopheles in Europe, Africa, and Indo-China, found it difficult to believe that a half-mile radius could be sufficient, and where there are many breeding places

just outside the limit it is not ; but, they say, " we gladly admit that in many instances it would have been hypercritical on our part not to accept the convincing evidence. Still, we should feel grateful if special investigations into the range of flight could be taken up." They lay great stress on the importance of statistical observations showing the trend of malaria in the untouched districts surrounding an experimentally controlled area. Without such observations, there is no proof that any reduction of malaria, which may occur, is anything more than a general symptom in that part of the country. Rural malaria control in India is practically limited to selected groups, such as troops or labourers on estates, mines, railways, and public works ; the Commission saw no instance of an all-round malaria control of any of the ordinary villages in which 90 per cent. of the people live. " Finally, we are certain of one thing," they say. " Public health work is much hampered by lack of funds. Unless there is more money available . . . we fear that anti-malarial work cannot be extended. Public health has been transferred to self-government. Consequently, the people, who elect their representatives, can provide public health or not as they like."

W. F.

PELTIER. Lutte antipaludique aux Indes Anglaises. [**The Anti-Malaria Campaign in British India.**]—*Ann. de Méd. et de Pharm. Colon.* 1930. July–Aug.–Sept. Vol. 119. No. 3. pp. 418–434.

The author records the impressions of a five-months' tour in India as a member of the League of Nations Malaria Commission (see above). There is a central organization for the study of malaria, the Malaria Survey, with a field experimental station at Karnal, where 20 to 25 medical men, yearly, are trained in the methods of investigating the disease. The central organization advises the provincial authorities on methods of malaria prevention, and assists them by making the surveys which are the necessary preliminaries to action. But there is no central body for carrying out preventive measures, nor is there any comprehensive plan for dealing with malaria. All problems of hygiene and public health are dealt with by district boards, municipalities, and the like, who are often too ignorant to appreciate the importance of anti-malaria measures, and refuse to vote the funds necessary for their execution. Prophylactic quininization has been abandoned in the army, and it is impracticable for the mass of the population. The use of the mosquito-net is confined to the European and the well-to-do; it is unknown to the bulk of the natives. Anti-larval measures have proved efficacious in limited areas where groups of people are collected together for the purpose of their work ; on mines, agricultural estates, railways, and public works. India has its town malaria ; there is malaria in Bombay, Lahore, Delhi and Lucknow. This is principally due to *A. stephensi*, which has habits like those of *Aedes egypti* and breeds in wells, jars, buckets of water, etc. It also breeds, together with *A. culicifacies*, in the ponds and water channels within the magnificent gardens of some of the native mansions. Here anti-larval work is hindered by lack of public co-operation and popular opposition. It is difficult to believe that anti-larval measures can be applied to the vast rural areas. Possibly something may be accomplished by attack-

ing only the dangerous anophelines; experiments on these lines have been made by the Rockefeller Foundation in Mysore. The methods adopted in the Punjab and in Bengal aim at increasing the resistance of the population to disease by raising the standard of living through improvements in agriculture and irrigation.

W. F.

CLEMESHA (Wm. Wesley) & MOORE (J. H.). **Five Years' Anti-Malaria Measures on the Travancore Tea Companies' Estates.**—*Indian Med. Gaz.* 1930. Dec. Vol. 65. No. 12. pp. 671–683.

This paper describes the successful employment of plasmoquine with quinine as an antimalarial measure, in *a labour force under complete disciplinary control*. The authors conclude that anti-gametocyte campaigns can be easily carried out with success on estates, but that "*such a thing is practically hopeless with a civil population.*" A reduction of even 70 per cent. of the carrying species of anopheles may be useless if there are many human carriers. Similarly, a reduction of 70 per cent. of the gametocyte carriers will avail little if large numbers of efficient anopheles are present. [See also MANALANG, below.] "Manifestly the only really scientific and mathematically correct method of stopping reinfections is to get the maximum reduction in the number of anopheles and the maximum reduction in the number of gametocyte carriers at the same moment." It is very important to carry out preventive measures at the right time of the year. In Travancore, the period of anopheline activity is March, April, May (the dry hot weather season), and June until the rains come and wash them away. Ninety inches of rain usually fall between June and September. Anti-gametocyte work is begun in February, in order to sterilize the carriers before the arrival of the mosquitoes. Anti-larval work is begun on March 1, or before if larvae are found; thorough oiling is carried out at weekly intervals, and the anophelines are never allowed to increase above the winter level; if the work were begun later, this object could not be achieved. In order to free the children from parasites, they are given the tasteless euquinine in sweetened condensed milk, and they take it with alacrity. In a badly infected group, small doses of plasmoquine are added twice a week. The anti-gametocyte treatment of adults consists of quinine and plasmoquine. During the first week, two cinchona febrifuge tablets, grains 5 each, are given every morning, and one is given at night. One tablet of plasmoquine compound is also given every night. During the second week, only tonic pills are given. During the third week, the first week's treatment is repeated. This course is given to all fever cases and to chronic relapsing cases.

Before the institution of this treatment, though vigorous anti-larval work was in progress, 34 per cent. of all the blood films examined contained gametocytes; after it had been in force for a year less than 5 per cent. of the slides contained gametocytes. The superiority of anti-larval work combined with anti-gametocyte treatment, to anti-larval work alone, is also demonstrated by figures from three other tea estates, where vigorous antimalaria measures were carried out, but no plasmoquine was given. On one, the number of cases of malaria per 100 coolies was 29; in another, 11; and in the third, 18. On the

five estates where plasmoquine was used, the numbers were 3, 3, 9, 5, 9. The cost of the antimalaria campaign during the year 1929–30, including oil, milk and euquinine, was just under 6,000 rupees, for the five estates comprising some 5,000 acres and employing about 3,000 coolies. The tea estates where this work was carried out are situated in the Periyar valley of the Travancore hill country which is notoriously malarious. Across it, blocking the Periyar river, is the great dam with a lake of 20 square miles behind it. As a result, the river below the dam is seldom flushed out, and is reduced to a chain of pools in a rocky bed. *A. culicifacies* is responsible for most of the malaria, and, in the ravines on the hillsides, *A. maculatus*, *A. funestus* var. *listoni*, and *A. aconitus* are found. Before antimalaria work was started in 1926, it frequently happened that 75 per cent. of the coolies were too ill to work; at the end of May, it was not uncommon to find a parasite rate of 100 per cent. in the cooly-lines, and, after a bad year, many deaths occurred from malarial nephritis during July and August. Since 1928, there have not been 10 serious cases of malaria; the labour out-turn, even in May, is 98 per cent., and the death rate per thousand, from all causes, is only about 20 per thousand. In 1930, malaria practically ceased to exist, so that the regular dosing of children was discontinued.

W. F.

RECORDS OF THE MALARIA SURVEY OF INDIA. Calcutta. 1930. Dec. Vol. 1. No. 4. pp. 429–565. With numerous illustrations.

The first paper is a note written by Major SINTON, at the request of the Malaria Commission of the League of Nations, dealing with researches to determine the relative values of the cinchona alkaloids in the production of a permanent cure in malaria. The second paper, by the same author, also deals with the relative value of these alkaloids. These two papers cover the same ground as that by the same author published in the *Indian Medical Gazette* (see below, p. 596). No case of quinine resistance was found among nearly 3,400 patients. The results of the analyses of several samples of cinchona febrifuge are given, which demonstrate the great variations in the composition of this substance. It is recommended that a standard of at least 50 per cent. of crystallizable alkaloids should be adopted, and that the amount of quinoidin, which appears to be the main cause of the unpleasant by-effects, should be diminished. *C. ledgeriana*, the cinchona tree which gives the highest yield of quinine, is delicate and costly to grow. The more hardy *C. succiruba* gives less quinine but more of the other, equally effective, alkaloids. It should be cultivated on a large scale for the production of a cheap cinchona febrifuge.

Dr. RAO, special Malaria Officer, Madras, contributes a note on the survey of Madras, which has been conducted during the last 3½ years. *A. culicifacies* is almost the only carrier. It breeds in pools formed by the rains, and in irrigation channels; attention directed solely to its breeding grounds would make many villages and small towns healthy. "The crux of the problem still is the areas under . . . irrigation. . . . On account of the conflicting interests of the several authorities concerned, no progress has been possible."

The next paper, by Colonel SHORTT, deals with spleen rates in the Garo Hills.

Captain CHALAM recommends Paris green for the treatment of ponds and tanks which are used for bathing and drinking. Oil is objectionable. Mosquitoes avoid water which has been treated with oil and lay their eggs elsewhere. They oviposit in water treated with Paris green, and the resulting larvae are killed by the next application. Water so treated acts as a mosquito-trap. Paris green penetrates vegetation and kills the larvae underneath. The thicker the vegetation the more Paris green is needed—1 lb. per acre in rice-fields, 2 lbs. per acre in water-hyacinth areas. A 1 per cent. dilution with powdered soapstone is employed.

Major COVELL and Subadar BAILY report on malaria in Sind (see YOUNG and MAJID, *ante*, p. 106).

W. F.

COVELL (G.). **The Malaria Problem in Bombay.**—Reprinted from *Jl. Bombay Natural Hist. Soc.* 1930. Nov. 15. pp. 736–742. With 1 map. [4 refs.]

Malaria has been present in Bombay since very early times. In 1908, there was an outbreak in connexion with the building of the Alexandra Dock, and Captain W. G. LISTON found that 25 per cent. of the *A. stephensi* caught in the neighbourhood were infected with parasites. Dr. C. A. BENTLEY confirmed this, and found that the principal breeding places were the house wells. A special malaria department was created on his recommendation, but this was abolished in 1918. Soon afterwards, partly on account of building operations, the disease increased; the crews of ships were infected in the harbour, members of the medical staff were infected in St. George's Hospital, and business was disorganized in the City to such an extent that 40 commercial houses sent in a petition to the Corporation, with the result that, in 1923, the malaria department was reconstituted. The only common anopheles in Bombay are *A. subpictus* ("*rossii*"), which is harmless, and *A. stephensi*. The latter will breed in dark places where the water is cold, or in roof cisterns exposed to the blazing sun; and it will pass through the narrowest openings to reach its breeding places. The permanent breeding places are: wells, cisterns, fountains, tubs, wet cellars, garden fountains, etc. It prefers fresh water. Its temporary breeding places are: roof gutters, tins, hollows in machinery, etc. The author found, during a survey made in 1928, that the disease was less prevalent in the neighbourhood of the Alexandra Dock than it was at the time of BENTLEY's survey, 17 years before, but it was far more widely diffused. This diffusion appears to be due to an enormous increase in the number of cisterns and to the installation of water-waste-preventers in connexion with a water-carriage system of conservancy. There are grave obstacles to the carrying out of preventive measures in Bombay: "various parts of the island are controlled by different authorities, the lack of co-operation among these authorities, the religious and sentimental objections to the closure of wells and the tendency to drag public health matters into party politics." (See LEAGUE OF NATIONS, above, p. 571.)

W. F.

Ramsay (G. C.). **Some Findings and Observations in an Anopheline Malaria Infectivity Survey carried out in the Cachar District of Assam.**—*Indian Jl. Med. Res.* 1930. Oct. Vol. 18. No. 2. pp. 533–552. With 3 folding graphs. [8 refs.]

Between April 1927 and March 1930, anopheles to the number of 42,300 were caught and dissected. Fifty-nine specimens of *A. minimus*, out of 3,874, were found to be infected, 27 of them with sporozoites. Not a single infected *A. maculatus* was found among 3,374 examined. *A. aconitus*, *A. philippinensis*, and *A. hyrcanus* were also found negative although many thousands were examined. The author concludes that *A. minimus* is practically entirely responsible for the transmission of malaria in tea estates in the Cachar district of Assam. *A. maculatus* and *A. aconitus* are notorious carriers in the Malay States, and *A. philippinensis* is a carrier in Bengal. In Assam, these species prefer to feed on cattle rather than man, and to this predilection Dr. Ramsay attributes their freedom from infection; in the Federated Malay States the coolies do not keep large herds of cattle, as the settled tea garden labour forces do in Assam. On one tea estate, with a spleen index of over 80, more than 2,000 specimens of *A. maculatus* were examined with negative results, although more than 2 per cent. of *A. minimus* were infected. It is interesting to note that it was difficult to find adult anopheles on the estates where anti-larval measures were in force; so rare were they that Dr. Ramsay offered a reward of 2 annas for each specimen of *A. minimus* or *A. ramsayi*, and a rupee for those found to be infected with malaria.

W. F.

Ramsay (G. C.). **The Malaria Problem of Assam.**—*Jl. Trop. Med. & Hyg.* 1930. Dec. 1. Vol. 38. No. 23. pp. 352–357. With 2 text figs. [4 refs.]

The author concludes, as the result of finding *A. minimus* breeding in a masonry-built well, that it will also breed in concrete inverts if they are not properly graded; i.e. mosquito control by inverts is dependent upon velocity of current. In masonry-built wells the light must be kept out by a suitable covering. In certain highly malarious sites, the breeding of *A. minimus* should be prevented by planting trees to shade the water.

W. F.

Watson (Malcolm). **The Saving of Port Swettenham.**—*Jl. Trop. Med. & Hyg.* 1930. Dec. 1. Vol. 38. No. 23. pp. 351–352.

The classical story of the saving of Port Swettenham is briefly told. Five months before the port was opened, the author reported to the government of the Malay States that "the Government staff shortly to be stationed there will be seriously affected." The predicted epidemic of malaria occurred, and was so severe that the High Commissioner telegraphed from Singapore ordering the closing of the port. Through the intervention of the author this order was suspended until the anti-malaria scheme which he recommended had been carried out. Thus "the port was saved . . . so began the great anti-malaria work of the

Government of the Federated Malay States, which was followed by that of the Government of the Straits Settlements, planters and others, with the results described in Major Walker's paper." (See WALKER, this *Bulletin*, 1930, Vol. 27, p. 630).

W. F.

MESNARD (J.) & BORDES (L. A.). L'importance du réservoir de virus autochtone dans la lutte contre le paludisme en Indochine. [**The Native Population as a Reservoir of Malarial Infection in Indo-China.**]—*Bull. Soc. Path. Exot.* 1930. Oct. 8. Vol. 23. No. 8. pp. 811–820. With 1 text fig. [6 refs.] [Pasteur Inst., Saigon.]

The native Mois are heavily infected ; 43 children from 3 villages all had enlarged spleens, and nearly all of them had parasites in their blood. The death rate among the children is high, but in adult life tolerance is established and, though ill health is common, acute attacks are rare. When new land is being opened up, the native Mois are employed to fell and clear the jungle, and to make roads ; building and planting are done by imported Annamite and Tonkinese labour supervised by Europeans. These susceptible immigrants, living and working side by side with the native Mois, become heavily infected and the results are disastrous. For example, 130 coolies were imported from Tonkin by the P.W.D., for building a bridge ; they suffered terribly from malaria and only 77 were left after 15 months. Some months later, a commercial company took over the construction, but their coolies remained healthy. *A. maculatus* was breeding freely in the river bed, and the conditions were the same in both cases, except that in the latter the native labour was encamped several kilometres away from the imported coolies.

W. F.

MORIN (Henry G. S.). Note sur le développement d'une campagne antipalustre en Cochinchine. [**An Antimalaria Campaign in Cochin China.**]—*Ann. Inst. Pasteur.* 1930. Nov. Vol. 45. No. 5. pp. 641–659. [Pasteur Inst., Saigon & Pasteur Inst., Paris.]

The Mekong Delta with its rice fields was formerly the most important part of the colony, and malaria was comparatively rare. The jungle-covered highlands—the red earth, laterite country—is now being developed by the rubber-planter, and malaria rages in the newly opened country. The red earth districts are particularly unhealthy ; coolies who have worked happily in grey earth country are attacked when they are transferred to a red earth estate. Sometimes health can be preserved if the coolies sleep at night outside the red earth district where they work by day. Apart from *A. vagus*, *A. maculatus* is the anopheline most frequently found in the larval stage, in the neighbourhood of dwellings infested with malaria. The larvae of *A. minimus* are found in smaller numbers, but adults of this species are more numerous in the cooly-lines than *A. maculatus*. Very few anophelines of any kind are found in the houses during the daytime, but if a night visit is made, they are buzzing with *A. maculatus* and *A. minimus*. Twelve out of 181 *A. minimus* were found to be infected, and on

epidemiological grounds it is almost certain that *A. maculatus* is also an important local carrier. Measures directed against these two species at several centres have produced a rapid reduction of sickness at these points. [See MORIN, *ante*, p. 112.]

W. F.

BEDIER (E.). Quelques considérations sur le paludisme au Laos. [**Malaria in Laos.**]—*Ann. de Méd. et de Pharm. Colon.* 1930. Apr.–May–June. Vol. 26. No. 2. pp. 201–218.

The French colony of Laos stretches along the left bank of the Mekong River in Indo-China. Part of the country consists of rice fields in flat plains, part of it is mountainous. The greater part of the scanty population lives in villages along the banks of the river and its tributaries. Malaria is the scourge of the country, and 22·7 per cent. of the hospital admissions are due to it. Most of the severe cases occur among immigrant Annamites and Europeans, but malaria causes a high mortality among the native Laotian infants and children, and in many places the splenic index is over 80 per cent. Quinine is distributed without charge, but without much benefit; the natives are quite willing to swallow it when it is given to them, but they will not trouble to come to the dispensaries to get it. The native huts stand in undergrowth, sheltered by the branches of large trees, and it is suggested that clearing would be beneficial. The author also recommends the formation of a special antimalaria service, with travelling units to visit the villages. [MORIN, see above, states that the chief carriers are probably *A. maculatus* and *A. minimus*. If this is true for Laos, clearing in the hilly country might be disastrous.]

W. F.

CARTER (Henry F.). **Observations on Epidemic Malaria in the South-western Lowlands of Ceylon.**—*Ceylon Jl. Sci.* (Sect. D. Med. Sci.) 1930. Nov. 7. Vol. 2. Pt. 4. pp. 177–189. With 4 figs. on 1 plate, 1 text fig. & 1 map. [3 refs.]

While approximately three-quarters of the low country of Ceylon is severely malarious, the remaining quarter—which stretches 22 miles up, 100 miles down, and 30 miles inland from Colombo—is not so, although the physical and climatic conditions of the district are such as would appear to be distinctly favourable to malaria. The key to the problem is probably the fact that, in these south-western lowlands, the notorious *A. culicifacies* and *A. funestus* are uncommon, while they are prevalent in the more malarious districts. Though these mosquitoes are scarce, their presence, even in small numbers, is a continual menace whenever artificial conditions are created which favour their increase, and several epidemics have occurred in the malaria-free lowlands. These epidemics have been strictly localized, associated with agglomerations of people imported into the neighbourhood in prisons or labour camps, and with prolific breeding of *A. culicifacies* in quarries or constructional works.

W. F.

CARTER (Henry F.). **Further Observations on the Transmission of Malaria by Anopheline Mosquitoes in Ceylon.**—*Ceylon Jl. Sci.* (Sect. D. Med. Sci.) 1930. Nov. 7. Vol. 2. Pt. 4. pp. 159–176. With 3 text figs. & 4 figs. on 1 plate. [1 ref.]

Investigations were carried out on a coconut estate near Chilaw, a coast town 50 miles north of Colombo, during the two years 1927 and 1928. The spleen rates of the children varied from nil to 100 per cent., and their parasite rates from nil to 30 per cent. *A. culicifacies* formed 87 per cent. of all anophelines caught in the cooly-lines and 3 per cent. of them were found to be infected with malaria parasites. The highest rate of infection in mosquitoes was during December, January and February; the highest rate of infection in children was from February to March. No infected mosquitoes were found in June, July, or October. No species other than *A. culicifacies* was found infected.

The most prevalent anopheline larvae were *A. culicifacies*, *A. funestus* var. *listoni*, *A. hyrcanus*, and *A. subpictus*. *A. culicifacies* was most abundant in unshaded trenches situated near the lines. *A. funestus*, on the contrary, showed a distinct preference for shade. (See CARTER and JACOCKS, this *Bulletin*, 1929, Vol. 26, p. 947.)

W. F.

UNION OF SOUTH AFRICA. ANNUAL REPORT OF THE DEPARTMENT OF PUBLIC HEALTH. YEAR ENDED 30TH JUNE, 1930. Annexure "C." pp. 74–76.—**Malaria: Administrative Position and Preventive Measures. Memorandum by the Department of Public Health.**

In this memorandum the Department of Public Health informs owners and occupiers that they are themselves responsible for carrying out measures against mosquitoes on their own land, and that it is the duty of local authorities to see that they do so, and to co-ordinate and assist their efforts. The Government is responsible for carrying out research and for giving advice on malaria problems. During last malaria season the Government employed 2 malaria officers, 5 inspectors, and a number of assistants in making malaria and mosquito surveys. Professor SWELLENGREBEL has been commissioned to make an extensive investigation, and was due to arrive in October 1930. A special malaria section has been established in the Department of Public Health, and a great deal of investigation as regards the mosquito carriers and their biology has been carried out in conjunction with the South African Institute for Medical Research. For some years past the Government has spent large sums on the free distribution of quinine.

"We sometimes hear of the 'eradication' of malaria in some particular locality—the Panama Canal zone or some tropical or sub-tropical town, mine, or estate. This term is apt to mislead the uninitiated; it is almost invariably used in a relative sense—meaning that the disease, as a result of vigilance and careful and continuous precautions, is being more or less completely prevented or kept at bay; when these precautions are relaxed or discontinued, malaria returns. It is true that by measures such as drainage of swamps and complete removal of all mosquito-breeding places in a particular area, malaria can sometimes—under very special conditions—be completely and permanently eradicated, but such measures are very expensive and of very limited application."

W. F.

WATSON (Malcolm). **Observations on Malaria in the Union of South Africa.**—*Union of South Africa Ann. Rep. Dept. Public Health Year ended 30th June, 1930.* Annexure "B." pp. 66–73.

The author's inquiries were limited generally to three areas. One included Munnik and Tzaneen; the second, the Nelspruit area; and the third, the Natal coast. His general conclusion is that much more investigation is necessary before any extensive anti-malaria schemes are adopted. "I would most earnestly recommend the Union Government," he writes, "to place its entomological and malarial knowledge on a sound scientific footing before it initiates any campaign for the control of malaria on an extensive or even a small scale." Tzaneen (Transvaal) illustrates the urgent need for further research. If the mosquitoes breeding in the river are harmless, the main mass of water within the township will not require control; if, on the other hand, the river mosquitoes are dangerous the malarial problem will be vastly complicated, and it may be beyond the financial resources of the community to control the disease. Investigation often shows that many of the most dangerous-looking places are quite harmless: throughout the whole of the sugar-growing area of Natal there are extensive swamps, but they do not appear to breed dangerous mosquitoes and money spent on draining them would be wasted.

W. F.

WATSON (Malcolm). **Malaria in Rhodesia and South Africa.**—*Jl. Trop. Med. & Hyg.* 1930. Dec. 1. Vol. 33. No. 23. pp. 350–351.

The author writes of the conclusions reached during his visits to Rhodesia and the Union of South Africa. The Rhodesian copper belt, and much of Africa to the south of it, is some 3,500 feet above sea level and it enjoys a cold season when malaria does not spread. Therefore, although within 13 degrees of the Equator, the disease is not severe when compared with what is seen in other parts of the tropics. The carriers are *A. gambiae* and *A. funestus*. Sir Malcolm was particularly interested in the latter, which, with its close allies *A. minimus*, *A. listoni*, *A. varuna*, and *A. aconitus*, is responsible for so much malaria in the East. To such mosquitoes he attributes the abandonment of large areas of Ceylon now covered by jungle which hides ruined cities and extensive irrigation works, witnesses to a former prosperity. In Bengal, too, *A. varuna* must be held responsible for at least some of the malaria which has desolated thousands of acres which were flourishing only fifty years ago. (See League of Nations Report and western Bengal, p. 571 above.) In Africa, the top of a valley often consists of a broad, shallow, catchment area known as a Dambo. These dambos are flooded in the rains; *A. funestus* is found breeding in practically every form of permanent water, and as soon as the rains come it migrates to the dambos. It is found among high grass and in streams shaded by virgin bush. Near the mining towns the dambos are drained, many miles of drains sometimes being required. Within the towns, constructional excavations are filled in; temporary collections of water are oiled. The antimalaria organization has been so successful that the author and his colleagues searched 247 huts within the controlled area without catching a single anopheles, although they were plentiful in the huts outside it. In Natal and Zululand,

work on the sugar estates is sometimes seriously hampered by malaria ; but the actual carriers of the disease are not known and, before work is begun on a large scale, it is essential that they should be identified.

W. F.

STEEL (C. R.). **General Observations arising out of Two Years Work on Malaria in a Lake Port.**—*Kenya & East African Med. Jl.* 1930. Nov. Vol. 7. No. 8. pp. 225–233.

The port and small town of Kigoma are situated on the shore of Lake Tanganyika, at the terminus of the railway from Dar-es-Salaam. There are sandstone hills behind the town, much of which is built on steep gradients. Mosquitoes do not breed in the great lake, which is subject to tremendous storms. *A. gambiae* is the probable carrier. Breeding occurs in streams and drains which become blocked with sand, but in addition there is much " works breeding " connected with scrap, such as old boilers and the like, and railway culverts. *Swarms of larvae are brought into the port in collections of water in barges, and in the life-boats of steamers.* Many houses are mosquito-proofed, but much of the screening is defective even when new. The officials of a Belgian company, who take 8 grains of prophylactic quinine daily, suffer less from malaria than the rest of the Europeans. " Government houses are built very often to a standard plan, set square in a plot and parallel with the front road. This arrangement does not, of course, take into account prevailing winds or the path of the sun, and it often gives rise to ideal mosquito-harbouring conditions, breathlessly hot rooms free from air circulation." [Tanganyika is not the only tropical country where this is done.]

W. F.

DE BOER (H. S.). **Anti-Malarial Measures in Towns.**—*Kenya & East African Med. Jl.* 1930. Dec. Vol. 7. No. 9. pp. 256–270. [4 refs.]

The health officer of a town should be responsible for the control of malaria, in the same way as he is responsible for the control of other infectious diseases ; it is wrong to suppose that malaria control needs a special officer. The scattered modern town, with its suburbs and open spaces, is more likely to be malarious than the old town of concentrated buildings, where people lived in their business premises. People cannot be compelled to take quinine, or to use mosquito-nets, or to kill mosquitoes ; anti-larval measures are the best means of malaria-control in towns. The control of all species by abolishing the mosquito pest, is more likely to gain public support than the control of only those mosquitoes which have been found dangerous. Temporary anti-larval measures have been effective in Mombasa, but permanent anti-larval works are preferable. Searchers for adult anophelines in houses and stables are important members of the anti-malaria staff ; they test the efficacy of control measures.

W. F.

Philip (C. R.). **Anti-Malarial Measures in Native Reserves.**—*Kenya & East African Med. Jl.* 1931. Jan. Vol. 7. No. 10. pp. 297–307.

In the Digo district of the Coast Province, where the author was stationed, the first step is to improve the condition of the people. A survey showed that one in every five adults, and one in every twenty children, were suffering from pulmonary tuberculosis ; about 20 per cent. of the males were infected with urinary schistosomiasis, and pyorrhoea was almost universal. The average haemoglobin value was 66 per cent. in adults and 57 in children ; 33 per cent. of the children had less than 50 per cent. and from 70 to 100 per cent. were suffering from ankylostomiasis. The spleen rate was 70 per cent. Considerable improvement followed mass treatment for ankylostomiasis and the institution of latrines ; the haemoglobin index increased by about 10 per cent., and the people were better able to grow the food which they required.

W. F.

Brousses (A.). Contribution à l'étude du paludisme en région saharienne. Observations recueillies à Djanet au cours de l'épidémie de 1928–1929. [**Malaria in the Sahara. The Epidemic at Djanet in 1928–1929.**]—*Arch. Inst. Pasteur d'Algérie.* 1930. Mar. Vol. 8. No. 1. pp. 77–84. With 1 map in text & 4 figs. on 3 plates. [1 ref.] [Pasteur Inst. of Algeria, Algiers.]

Djanet is a small oasis in the middle of the Sahara with a population of about 1,200 natives and a garrison of 41. From the time of its occupation by the French in 1912, until 1928, there was no indigenous malaria ; anophelines do not breed in the wells, there are no streams, and it rarely rains. In January 1928, there was heavy rain which was followed, in May, by a sharp epidemic with 253 cases among the inhabitants and 21 in the garrison. A new anopheline, resembling *A. hispaniola*, was found in the rain-water pools. This new species was named *A. broussesi* by Mr. F. W. Edwards, of the British Museum, to commemorate its discovery by the author.

W. F.

Schwetz (J.). Le problème de la prophylaxie antipaludique dans les grands centres congolais en général et à Stanleyville en particulier. [**The Problem of Antimalarial Prophylaxis in the Big Centres of the Congo, and in particular at Stanleyville.**]—*Riv. di Malariologia.* 1930. Sept.–Oct. Vol. 9. No. 5. pp. 609–624. [13 refs.] English summary p. 664.

In Leopoldville 73 per cent. of the children were found to be infected with parasites ; in Elizabethville, 45 per cent. ; in Stanleyville, 85 per cent. Benign tertian infections are uncommon ; in 952 native children in Stanleyville, nearly a quarter of the infections were quartan, the rest were malignant tertian ; there was not a single benign tertian infection. The most important carrier is *A. gambiae* (11·5 per cent. infected with sporozoites). Less important carriers are *A. nili* (5·3 per cent. with sporozoites), *A. marshalli* var. *moucheti* (4·5 per cent. with sporozoites), and *A. funestus* (4·2 per cent. with sporozoites). Minor

anti-mosquito measures have proved a complete failure, and the Administration has extensive engineering projects in view with the object of obliterating the breeding places of mosquitoes in the marshes and along the banks of the great river in the three principal towns. The author warns them that the projected works are vast and costly and that it is unlikely that their aims will be realized. In any case it will be long before they can be completed, and in the meantime he advises the suppression of the artificial breeding places due to human activities, and the use of prophylactic quinine.

W. F.

Godoy (A.), Lobo (A.) & Cruz (Oswaldo), Jr. Sur les anophélinées qui transmettent le paludisme au Brésil. [**Anophelines transmitting Malaria in Brazil.**]—*C.R. Soc. Biol.* 1930. Dec. 12. Vol. 105. No. 34. p. 731.

Dr. Lobo has succeeded in infecting *A. tarsimaculata* with *P. vivax*. Sporozoites were present in the salivary glands. One naturally infected *A. albitarsis* was found among 200 caught in infected houses.

W. F.

Ananian (S.). Données préliminaires sur la parasitologie du paludisme en Arménie. [**Preliminary Note on the Parasitology of Malaria in Armenia.**]—*Rev. Microbiol., Epidémiol. et Parasit.* 1930. Vol. 9. No. 2. pp. 231–235. With 1 map in text. [In Russian. French summary pp. 285–286.]

The examination of 35,854 specimens of blood at the tropical disease stations of Armenia, during the three years 1925–7, showed that 50 per cent. of the infections were due to *P. vivax*, 20 to 45 per cent. to *P. malariae*, and 10 to 15 per cent. to *P. falciparum*. *P. falciparum* is more common in the mountainous parts. The predominant anopheline is *A. maculipennis*, but, in addition, *A. pseudopictus*, Grassi, is common in the plains, and *A. superpictus*, Grassi, in the mountains.

W. F.

Schilling (Claus). Neuere Gesichtspunkte für die Bekämpfung der Malaria, besonders in Italien. [**Recent Views on Antimalarial Measures, particularly in Italy.**]—*Med. Klin.* 1930. Nov. 14. Vol. 26. No. 46 (1353). pp. 1697–1698. With 1 text fig. [Robert Koch Inst., Berlin.]

With the help of a diagram the author recalls the basic principles of antimalarial measures. It appears that the early antimalarial experiments in the Campagna and Pontine marshes failed because the land recovered by drainage was not immediately intensively cultivated and planted with crops; also the cattle should have been placed in stalls. In the planning of a colony in Maccarese, in the neighbourhood of Rome, the cattle stalls were brought under the same roof as the dwellings, but only the latter were protected with wire gauze. The cattle were not allowed in the fields. It may be accepted that in this way "zoophilic" strains of anopheles were bred up. The agricultural advantages (milk, crops) were apparent, but a large capital was required, 20 million lira for the Maccarese scheme alone. The population of Maccarese increased from 200 to 2,800. The malarial morbidity in

1924 was about 880 per mille, in 1928 about 110 per mille. In the whole Campagna the morbidity for 1928 alone was over 34 per cent. This " bonification," carried out by a systematic cooperation of practical scientific workers, gives the impression that such a combination is certainly of value.

E. D. W. Greig.

MARCHIAFAVA (Ettore). **Pernicious Malaria.**—*Amer. Jl. Hyg.* 1931. Jan. Vol. 13. No. 1. pp. 1–56. With 3 text figs. [18 refs.] [Experim. Station, Anti-Malaria Campaign, Rome.]

It would be almost sacrilegious to attempt to summarize the professor's monograph. It contains so much that is of value, drawn from his great store of knowledge and experience, that it should be read in the original. He states that his object is to present to medical practitioners the fundamental notions about pernicious malaria, and that much of what is set forth is to be found in the " Trattato sulla Malaria " published by BIGNAMI and himself in 1902.

W. F.

MANALANG (C.). **Does the Amount of Malaria depend on the Number of Transmitting Mosquitoes?**—*Jl. Trop. Med. & Hyg.* 1931. Jan. 15. Vol. 34. No. 2. pp. 19–27. [13 refs.]

The importance of the number of anophelines in a district can only be determined if surveys are made before and after, as well as during, an outbreak of malaria. The number of mosquitoes caught in houses is not a good measure of mosquito density. HACKETT could find no *A. funestus* (*minimus*) in Philippine houses, during a seven-day visit, though many were being caught in traps. The number to which anopheles must be reduced in order to diminish malaria differs at different times and in different places ; this accounts for the varying results of measures for mosquito control. The systematic examination of mosquitoes for sporozoites gives more valuable information than the mere enumeration of the transmitting species. " Mosquito density in a locality at a given period is of importance only when the infective number in the same locality during that period is known."

W. F.

SINTON (J. A.), HARBHAGWAN & SINGH (Jaswant). **The Numerical Prevalence of Parasites in Relation to Fever in Chronic Benign Tertian Malaria.**—*Indian Jl. Med. Res.* 1931. Jan. Vol. 18. No. 3. pp. 871–879. With 1 chart in text. [16 refs.]

Observations on young soldiers at Kasauli, who were suffering from chronic benign tertian malaria, showed that pyrexia began when the number of parasites reached about 5,000 per cmm. (the pyrogenic threshold). In early cases, the pyrogenic threshold is only about 200–500. The higher threshold observed in chronic infections suggests the development of tolerance.

W. F.

KNOWLES (R.) & GUPTA (B. M. Das). **Clinical Studies in Malaria by Cultural and Enumerative Methods.**—*Indian Med. Gaz.* 1931. Jan. Vol. 66. No. 1. pp. 1–11. With 5 coloured figs. on 1 plate. [20 refs.]

Fifteen cases of malaria were kept untreated as long as possible, in order to study the mechanism of spontaneous cure. Almost all of them were suffering from chronic infections. The authors conclude that there is a definite tendency towards spontaneous cure in malignant tertian infections, but that in benign tertian the tendency is in the opposite direction, namely towards chronic disease and relapses. In one case of malignant tertian, a polymorphonuclear leucocyte and a large hyaline leucocyte were each seen containing an ingested schizont and this is considered to have an important bearing on the question of spontaneous cure. Crescents are more numerous during September than during July and August, in Bengal. In convalescent cases of malignant tertian, quinine increases the number of crescents. [Russell AMIES, see p. 597 below, does not agree with this.] In one case, after crescents had persisted 41 days, in spite of quinine, they were got rid of by plasmoquine in two days. Tests of the urine with Mayer's reagent showed that the Government cinchona febrifuge tablets were too hard and were not absorbed. [The evidence is not quite convincing.] SINTON'S standard treatment was found too complicated and too drastic. The authors suggest 10 grains of quinine twice a day with alkalis, for 10 days, and 0·01 gram of plasmoquine daily for the last six days. " The final test for cure should be that a Bass culture, taken with 5 cc. of the patient's blood after all alkaloids have been eliminated as tested in the urine, should remain sterile." [But this would not mean that the patient was permanently cured.] A coloured plate is given, but it is not easy to find out to what the figures refer. The authors state that cinchonine is particularly toxic [which is contrary to the finding of most investigators] and that Indian cinchona febrifuge contains less of this alkaloid than the Java febrifuge. They also recommend that the urine should be collected over the twenty-four hours and tested with Mayer's reagent, to make certain that the quinine is being absorbed. [It is preferable, for several reasons, to test freshly passed samples twice a day.]

W. F.

LADYJENSKI (P. M.). [**Malaria in Children in the Dniestr Region.**] —*Trop. Med. & Veterin.* Moscow. 1930. Vol. 8. No. 1. pp. 1–4. [9 refs.] [In Russian.]

In the districts adjoining the river Dniestr, in Russia, where malaria is endemic, 41·7 per cent. of cases observed were children up to the age of fifteen. Cases of benign tertian were predominant (343), malignant tertian (47) and quartan (2) being of secondary importance. The clinical course of the disease in children was atypical, the attacks in the majority of cases being quotidian and a high temperature (minimum 38°–37·5° C.) being maintained even between the attacks. In eight cases the author made observations on infants born from infected mothers. In all these blood was taken from the mother, from the placenta and from the new-born infant, with the following results :—

Nos.	Mother.	Placenta.	Child.
1.	*P. falciparum.*	Nil.	*P. falciparum.*
4.	,,	Nil.	Nil.
5.	,,	*P. falciparum.*	*P. falciparum.*
7.	,,	,,	,,
8.	,,	,,	,,
2.	*P. vivax.*	*P. vivax.*	*P. vivax.*
3.	,,	Nil.	Nil.
6.	,,	*P. vivax.*	*P. vivax.*

The author holds that the infection is transmitted from parent to foetus only when the placenta is damaged and that in the temporary absence of parasites from the circulation of the mother (during treatment) infection of the offspring can be prevented.

[See also Wislocki, p. 593, below.]

C. A. Hoare.

Ziemann (Hans). Beitrag zur Frage der sogenannten Kriegsmalaria. (**A Contribution to the Problem of the So-called "War-Malaria."**)—*Riv. di Malariologia.* 1930. May–June. Vol. 9. No. 3. pp. 261–270. French summary. English summary (6 lines) p. 360.

This is a paper contributed to the International Malarial Congress at Algiers in 1930. As regards the latent period of malaria there is an undoubted possibility of its extending to 10 years, but 5 years after infection the attacks become always slighter, and, for practical purposes, may be regarded as ceasing after 7–8 years. In practice it is only malignant tertian infections which produce permanent organic changes in the organs [Giglioli, working in British Guiana, states that " in cases of malignant tertian the danger of chronic nephritis need not be considered."]. The author considers that no causal connexion between malaria and pernicious anaemia, leukaemia, and some other morbid conditions has been established.

E. D. W. Greig.

Heinemann (H.). Zur Frage des Einflusses der Malaria auf den Widerstand des Organismus bei Tuberkulose. [**Effect of Malaria on the Resistance of the Body to Tuberculosis.**]—*Deut. Med. Woch.* 1930. Dec. 26. Vol. 56. No. 52. pp. 2213–2214. [6 refs.]

The author deals with the contribution of Kyriasidis on this subject [*ante*, p. 118]. He agrees with Kyriasidis that epidemiologically there is no evidence that malaria paves the way for tuberculosis, and that opsonin estimation is valuable for measuring the power of malaria to produce resistance to tuberculosis. However, he parts company with him on the question of the value of the von Pirquet reaction as an indicator of the resistance of the malaria infected patient to tuberculosis.

E. D. W. Greig.

Kligler (I. J.) & Mer (G.). **Studies on Malaria : VI. Long-Range Dispersion of Anopheles during the Prehibernating Period.**—*Riv. di Malariologia.* 1930. July-Aug. Vol. 9. No. 4. pp. 363–374. With 2 charts & 4 figs. in text. [6 refs.] [Hyg. Dept., Hebrew Univ., Jerusalem.]

Mosquitoes, *A. elutus*, were caught in tents, houses, and stables at Melaha, close to the swamp where they breed ; at Ayeleth, a small

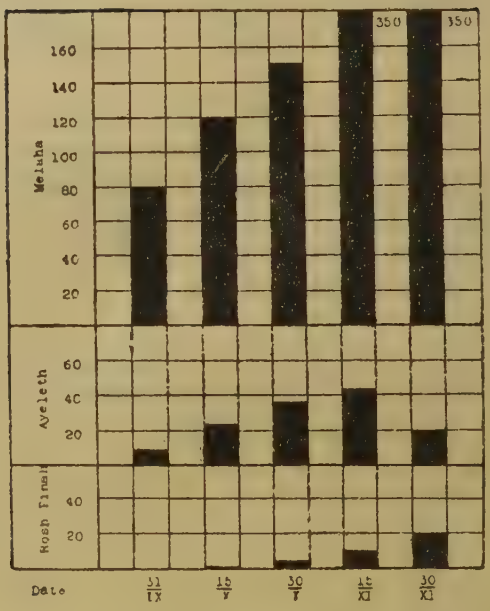

Chart 1. Relative concentration of *A. elutus* at Melaha in the marsh area, at Ayeleth in the plain 3 miles off, and at Rosh Pinah a large hill settlement 6½ miles from the breeding place, computed from their observed density in fixed catching stations during the migration period.

[Block kindly supplied by the *Rivista di Malariologia*.]

settlement in the plain 3 miles away; and at Rosh Pinah, a large settlement in the hills, 6½ miles from the breeding ground. The chart indicates the results. Epidemics occur at Rosh Pinah, in the late autumn, due to the long distance dispersion of anopheles from the marsh during the pre-hibernating period. They feed during the stages of their flight and arrive infected. The incidence of infected mosquitoes (2·8 per cent.) at Rosh Pinah, where there are very few gametocyte-carriers, was almost as high as at Melaha (3·5 per cent.) near the swamp. In the mosquitoes destined for hibernation, blood-feeds lead to deposition of fat, instead of to development of the ovaries, and the abdomen becomes distended and cylindrical. They are born without fat and only accumulate it slowly after a number of feeds. The degree of fat and the incidence of fat-containing females may serve as a gauge of the distance of a place from the breeding-place. The incidence of fat-containing *A. elutus* at Rosh Pinah was greater than at Ayeleth; at Ayeleth it was greater than at Melaha. About 4 blood meals are required for maximum fat deposit. The life of these hibernating mosquitoes is relatively long, and it is apparently the females, destined for hibernation, which make the long flights.

W. F.

DE BUEN (Sadi). Algunas consideraciones sobre la conservacion del virus paludico en la epoca interepidemica. [**The Conservation of Malaria Virus in Interepidemic Periods.**]—*Medicina Países Cálidos.* Madrid. 1931. Jan. Vol. 4. No. 1. pp. 19–23. French summary (6 lines). [Antimalaria Inst., Navalmoral de la Mata, Cáceres, Spain.]

In Navalmoral and Talayuela the first brood of mosquitoes generally emerges in the first half of April ; hence patients suffering from malaria in the first four months of the year cannot have acquired infection from the mosquitoes of the same year, and it is quite exceptional to find that the few mosquitoes present in the houses during the cold months will bite man. Hence, the cases which are met with during the early part of the year are either relapses or instances of prolonged incubation. The author studied 237 patients and 159 (67·5 per cent.) of them gave a history of malarial attacks in the previous year, while 78 (32·5 per cent.) gave none, that is suffered from an attack at a time when transmission was practically zero. More detailed analysis of 183 patients (150 children under 9 years and 33 adults) showed that 115 had had attacks the year before, 68 had not. During the winter months it is very rare to find parasites (*P. vivax*) in the blood of children ; in fact, only 3 were positive out of 801 examined (0·37 per cent.). From the figures given in a table the number of adult patients with the parasite in their blood was relatively more than double that of children—69·3 as compared with 30·0 per cent. [but the number of adults was, as stated above, only 33]. In another table figures show that children in the first 9 years of life (as judged by comparatively small numbers) are 5 times as receptive (2–7 attacks per patient) as adults (0·5–0·47 attacks). The author concludes that :

(*a*) Cases of benign tertian with prolonged incubation are of great epidemiological importance. (*b*) Such are more frequent in adults than in children, owing to the lower receptivity of the former [and consequently longer incubation period]. (*c*) In the district dealt with relapses in children account for more attacks in the early months of the year.

H. H. S.

KORTEWEG (P. C.). Waardoor wordt het koortsbeloop bij primaire malaria tertiana beheerscht ? Wat is het normale beloop : tertiaan of quotidiaan ? [**What governs the Temperature in Primary Tertian Malaria ? What is the Normal Course : Tertian or Quotidian ?**]—*Nederl. Tijdschr. v. Geneesk.* 1931. Apr. 4. 75th Year. 1st Half. No. 14. pp. 1750–1763. With 2 figs. [11 refs.] [Inst. for Trop. Hyg., Wilhelmina Hosp., & Psychiat.-Neurol. Clinic, Amsterdam.]

The answer to the last question, as given in text books, is universally tertian, with the explanation of a double infection to account for quotidian symptoms. But, as a result of the use of malaria infection for the treatment especially of dementia paralytica, doubt has arisen of the correctness of this answer. The author in many years' experience of country practice formed the impression that in the majority of cases first attacks of malaria exhibit tertian characters to begin with and later, with the development of a second generation of plasmodia, tend to become double tertian, that is to say quotidian. In the application of malaria therapy two methods are employed, direct inoculation of

blood from case to case and transmission by malaria infected mosquitoes. In 236 cases with inoculation of malarial blood a tertian fever developed and continued as such in 57. In 61 cases the fever was tertian to begin with and became quotidian later. Eighty cases were purely quotidian and 38 cases were of irregular character. This leads the author to the pronouncement that tertian malaria shows a tendency to become quotidian; quotidian on the contrary shows little tendency in its continued course to become tertian. In Amsterdam the malaria infection is, as a rule, brought to an end by means of neosalvarsan followed later by quinine. The parasites seldom disappear entirely under neosalvarsan and during this the patients can be and are used as donors for further inoculations

It was the application of the infected mosquito method of inoculation, however, which led JAMES in England to question the correctness of the term "tertian" as truly descriptive. His experience showed that the primary tertian malaria attack in 80 per cent. of cases did not exhibit a tertian but a quotidian fever and this whether the patient was bitten only once by one mosquito or by several mosquitoes at different times. In his cases the transition was from quotidian to tertian and not the reverse. In Amsterdam the number of cases of mosquito infection was not large. Care was taken also that an interval of 48 hours should elapse between bites, seeing that an interval of 24 hours is more likely to give rise immediately to the development of two generations of parasites. Of the 38 cases analysed 20 showed pure tertian symptoms from beginning to end; 10 began as tertian and later became quotidian, while 8 were purely quotidian. These results are the reverse of those obtained by JAMES and the author here reaffirms his statement made with regard to malaria produced by direct blood infection :—Tertian malaria shows a tendency to become quotidian in regard to its temperature curve; quotidian on the contrary shows little tendency in its continued course to become tertian. Can the difference, he asks, between the results obtained in England and Holland be due to a different strain of parasite ? The former was obtained originally from Madagascar, the latter from the neighbourhood of Amsterdam. The two sets of trials show some differences in incubation time for the development of the malaria attack.

W. F. Harvey.

SERGENT (Edm.), SERGENT (Et.) & CATANEI (A.). Paludisme des oiseaux. Une question de nomenclature. Le nom de *Plasmodium praecox* doit-il désigner un parasite du paludisme humain ou un parasite du paludisme aviaire ? [**Should the Name** *Plasmodium praecox* **be applied to a Malarial Parasite of Man or of Birds ?**]—*Arch. Inst. Pasteur d'Algérie.* 1929. Sept.–Dec. Vol. 7. No. 3–4. pp. 223–238. With 1 text fig. [10 refs.] [Pasteur Inst. of Algeria, Algiers.]

The names *Plasmodium praecox* and *Plasmodium relictum* are both used to describe the same parasite of birds, namely that with which Ross did his classical experiments. In 1890, GRASSI and FELETTI thought that the parasite of bird malaria and the one associated with quotidian fever in man were identical, and they called them *Plasmodium praecox*. Subsequently, they found that they were dealing with two distinct species, and, in January 1891, they gave the name *P. relictum* to the bird parasite and retained the name *P. praecox* for the human parasite. The authors therefore conclude that *P. praecox* is the correct name for the human parasite. Prof. C. W. STILES, however, disagrees with them : he argues, from one

of Grassi and Feletti's notes, that they first gave the name to an avian parasite, and later extended it to the human parasite, which they thought—but were never quite sure—was the same. The host type is therefore a bird, according to Stiles, and the name *P. praecox* should be reserved for the avian parasite.

W. F.

Castellani (Aldo). **Malaria simulating Various Other Diseases including Certain Surgical Conditions.**—*Jl. Trop. Med. & Hyg.* 1930. Dec. 1. Vol. 38. No. 23. pp. 357–364. With 3 charts in text. [14 refs.]

The object of this paper is to call the attention of medical men practising in non-malarious countries to those atypical clinical manifestations which are important from a practical point of view, and which occasionally occur in patients who have returned to England from the tropics. Numerous cases, drawn from the author's wide experience, illustrate how malaria can mimic other diseases. Pseudo-appendicitis due to malaria is well known; cases resembling cholecystitis, acute haemorrhagic pancreatitis, general peritonitis, and abscess of the liver are also described. With regard to the last disease, it is said—and all will agree—that mistaking abscess of the liver for malaria is a far more common error than mistaking malaria for an abscess. Sometimes malaria causes symptoms like those of dysentery or cholera, and the story is told of a patient who was about to be removed to an infectious diseases hospital, with a diagnosis of cholera, when an examination of the blood revealed the true nature of his illness, which was cured in a couple of days with quinine. In 1915, the author investigated an outbreak of so-called scurvy in a Serbian regiment. The symptoms were petechiae, subcutaneous extravasations, bleeding gums and haemorrhages from the orifices of the body. All improved in a remarkable manner on quinine. Hemiplegias, monoplegias, and peripheral neuritis may be caused by malaria, and the author has seen a case of clinically typical transverse myelitis, due to malaria, and three cases closely resembling disseminated sclerosis. He has also seen two cases of apparent mania, and one of apparent melancholia, cured by quinine. Malarial psychoses may have great importance from a medico-legal point of view.

W. F.

Wislocki (George B.). **Observations on the Placenta from a Case of Malaria.**—*Bull. Johns Hopkins Hosp.* 1930. Sept. Vol. 47. No. 3. pp. 157–163. [1 ref.] [Anat. Dept., Johns Hopkins Univ., Baltimore.]

"The villi, including their stroma and covering chorionic syncytium, were anatomically normal and not visibly affected by the malarial organisms or their products. It is unlikely that malarial organisms can enter or penetrate the chorionic syncytium, so that the transmission of malaria from mother to foetus occurs rarely, if at all." The author reached this conclusion from the histological examination of the placenta of a woman admitted to hospital with (? subtertian) malaria. She received 5 hypodermic injections of quinine (7½ grains each) in the 2½ days prior to her delivery, and, when this took place, no parasites were found in films of her peripheral blood. The placental blood, on the other hand, contained many segmenting and presegmenting forms; from which it is concluded

that malaria parasites in the placenta are immune to damage by quinine. The malarial pigment was taken up by monocytes. Though this pigment is very finely divided, no trace of it could be found either in the chorionic syncytium or in the underlying foetal stroma protected by this impermeable structure. [See this *Bulletin*, Vol. 26, p. 11, & Vol. 23, p. 130.]

W. F.

Mühlens (P.). Ueber Malariatodesfälle bei Seeleuten insbesondere zwei Fälle von Malariaenzephalitis. [**Two Cases of Malarial Encephalitis in Seamen.**]—*Deut. Med. Woch.* 1931. Mar. 13. Vol. 57. No. 11. pp. 440–443. [1 ref.] [Inst. for Ship & Trop. Diseases, Hamburg.]

The author describes two cases of haemorrhagic encephalitis caused by malignant tertian malaria in seamen who had returned from the West Coast of Africa. He strongly recommends for seamen on ships trading to the West Coast of Africa a combined quinine and plasmochin prophylaxis, which should be continued until the ship returns to the home port and indeed for 8–14 days longer.

E. D. W. Greig.

Skliar (N.) & Rjabowa (M.). Ueber Malariapsychosen. [**Malarial Psychoses.**]—*Monatsch. f. Psychiat. u. Neurol.* 1931. Jan. Vol. 78. No. 1. pp. 1–29. [14 refs.]

Professor Skliar for the last 6½ years has been stationed in Astrakhan, where malaria is almost endemic. He and Dr. Marie Rjabowa studied 75 cases of psychoses, 49 males and 26 females. They give a full account of the cases. A particular problem which they wished to solve was whether or not there is a specific malarial psychosis. They concluded that such a mental disturbance as could be differentiated from psychoses caused by other infectious diseases did not occur, although there were some differences in details which might be ascribed to the malaria. [No details are given regarding the blood examination of the cases of malaria.]

E. D. W. Greig.

Melnotte (P.). Contribution à l'étude des atteintes rénales au cours du paludisme. [**Kidney Disease in Malaria.**]—*Bull. Soc. Path. Exot.* 1930. Nov. 12. Vol. 23. No. 9. pp. 958–966. [14 refs.] [Milit. Hosp., Strasbourg.]

The author has found a transient albuminuria, during the attack of fever, in one-third of his cases. The rarity of chronic nephritis he attributes to quinine treatment. Casts were found in 10 per cent. of the patients with albuminuria. Uraemia is common in pernicious malaria, and is due to a lowering of the chlorides in the blood. The main conclusion is that the renal manifestations are usually secondary to lesions in the liver. (See also Giglioli, *ante*, p. 131.)

W. F.

Bosch (W. G.). Een geval van quartana-nephrose. [**A Case of Quartan Fever Nephrosis.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1930. Nov. 1. Vol. 70. No. 11. pp. 1101–1104. [4 refs.] [Catharina Hosp., Dutch American Plantation Co., Kisaran.]

A case of quartan fever combined with acute nephrosis in a Javanese girl of 4½ is described in some detail. The hydrops disappeared completely and only a trace of albumin was found in the urine 3 months after the

onset of the disease. Apart from the clinical course of this case the relatively frequent concurrence of nephrosis and quartan fever, the rarest type of malaria, suggests an aetiological connexion, which has already been noticed by LAVERAN, and certainly deserves further attention.*

W. J. Bais.

MONTELEONE (Remo). La riattivazione della malaria latente con il Ca Cl_2. (**Calcium Chloride as a Provocative in the Diagnosis of Latent Malaria.**) —*Riv. di Malariologia.* 1930. May–June. Vol. 9. No. 3. pp. 257–260. English summary (4 lines) p. 360.

When patients present themselves with a history pointing to recent malaria but with temperature normal and no parasites in the blood, the author administers an intravenous injection daily of 10 cc. of a 10 per cent. solution of $CaCl_2$. On the second or third day the temperature rises and examination of the blood reveals parasites. He gives brief notes of four such cases.

H. H. S.

GUPTA (B. M. Das). **A Fatal Case of Malaria in a Diabetic Subject.**—*Indian Med. Gaz.* 1931. Jan. Vol. 66. No. 1. pp. 20–21. With 1 coloured plate. [7 refs.]

Blood-inhabiting protozoa require sugar for their nutrition. Dextrose is necessary for the cultivation of malaria parasites *in vitro*, but they can be cultivated in diabetic blood without further addition. Trypanosomes use up blood sugar, and death in experimental animals may occur in a condition of acute hypoglycaemia. In a case of chronic, afebrile, malignant tertian malaria, formerly under the author's care, a large dose of glucose regularly produced an increase of parasites and a febrile relapse.

The patient to whom this paper refers was under treatment for diabetes and contracted subtertian malaria after his blood sugar had been brought down to normal. Coma supervened and he died. Twelve hours before death the blood sugar was only 0·0714 per cent. A coloured plate is given showing the large schizonts in the peripheral blood, which are characteristic of these fulminating cases. [The duration of the malaria is not stated. It is not clear that there was any abnormal quantity of sugar in the blood at the time of the attack.]

W. F.

SHIHA (M. M.). **Discussion on Malarial Dysentery.**— *Jl. Egyptian Med. Assoc.* 1930. Dec. Vol. 13. No. 12. pp. 586–589. [4 refs.]

This paper deals with the causation of the dysentery which occurred in a number of heroin addicts infected with malaria, and which Dr. ARAFA attributed to malaria (see this *Bulletin*, 1930, Vol. 27, p. 657). The author has had experience of heroin addicts who took the drug by snuffing it up the nose ; they were consequently free from the syringe-carried malaria which affected ARAFA's cases, yet they suffered equally from dysentery. It is argued from this that stopping the heroin on admission to hospital was probably the true cause of the gastro-intestinal symptoms, in both series.

W. F.

* See also this *Bulletin*, Vol. 27, GIGLIOLI, p. 509, and GOLDIE, p. 651.

Tamalet (E.). Paludisme et lithiase biliaire. (**Malaria and Cholelithiasis.**) —*Riv. di Malariologia.* 1930. July–Aug. Vol. 9. No. 4. pp. 388–399. [17 refs.] English summary (5 lines) p. 477.

Out of 1,120 old malaria cases the author found 8–9 per cent. suffering from gall-stones. He considers cholelithiasis to be a complication of malaria, due to haemolysis, hypercholesterinaemia, repletion of the liver, etc., which cause a disturbance in the colloidal equilibrium of the bile; thus calculi, which have a nucleus of bile pigment and concentric layers of cholesterin, are formed.

[Tidy gives the frequency of gall-stones, in all autopsies, as 5 to 12 per cent.]

W. F.

Sinton (J. A.). **A Suggested Standard Treatment of Malaria based upon the Results of the Controlled Investigation of over 3,700 Cases.**—*Indian Med. Gaz.* 1930. Nov. Vol. 65. No. 11. pp. 603–620. [30 refs.]

During the past nine years the Indian Research Fund Association has financed a quinine and malaria inquiry. The British patients were adult soldiers, and the Indians were adult prisoners in the Lahore Central Jail. The British cases were nearly all very chronic; many of the Indian cases were fresh infections. During the whole course of the investigations, no case of quinine resistance was encountered. Though the parasites seemed to persist longer in fresh than in chronic infections, there were more relapses after treatment in the chronic cases, and they were more difficult to cure. Among 1,401 cases of malignant tertian under quinine treatment, the fever lasted more than 5 days in only 7 instances, and the maximum was 6 days. Among 1,846 cases of benign tertian, only 18 had fever for more than 3 days, and none for more than 4½ days. The reason why some workers have succeeded with intramuscular injections, in cases where they have failed with oral quinine, is that they have not taken precautions to ensure that the oral quinine was swallowed and absorbed. For intramuscular injections "there seems only one indication, and that is in those very rare comatose cases, usually children, where oral administration, or intravenous injections, are found impossible." Citric acid, which is absorbed into the body as an alkali, is to be preferred to mineral acids as a solvent for the cinchona alkaloids, in order to avoid increasing the acidosis associated with malarial attacks. Where there is vomiting, the oral administration of 20 minims of adrenalin solution (1 in 1,000) has never failed to permit the use of the alkaloids by the mouth. Though prolonged courses of treatment give a slightly higher rate of permanent cures, the difference is not sufficient to warrant the extra time and expense. As regards plasmoquine, it is probable that a daily dose as low as 0·04 gram is excessive for routine treatment; it should always be given under medical supervision. It has little or no action in malignant tertian malaria, except upon the crescents.

The suggested routine treatment is as follows: In severe cases specific treatment should be begun without delay, but, in the ordinary case, give 3 grains of calomel followed by one ounce of magnesium sulphate dissolved in warm water. Two mixtures are used:—

Mist. A.			*Mist. Q.*		
Sod. bicarb.	grains	60	Quin. sulph.	grains	10
Sod. citrat.	grains	40	Citric. acid	grains	30
Calc. carb.	grains	3	Mag. sulph.	grains	60
Water to	ounce	1	Water to	ounce	1

(Cinchona febrifuge may be used instead of quinine.)

After the preliminary purge has acted, Mist. A. is given hourly for 3 hours. Half an hour after the third dose, Mist. Q. is given. Thereafter, the mixtures are given three times a day for a week, the alkaline mixture being given half an hour before the quinine mixture. In addition, plasmoquine 0·015 gram is given, once daily after food, throughout the week of treatment. If a relapse occurs, the treatment is repeated for one week, and continued for a second, with two doses instead of three and no plasmoquine, in malignant tertian cases. In benign tertian, the daily dose of plasmoquine may be raised to 0·02 gram during the 14-day course. In chronic relapsing infections, the three daily doses of Mist. A. and Mist. Q. are given during the first week, followed by two weeks on two daily doses, and a total daily dosage of 0·03 to 0·04 gram of plasmoquine is given in two divided doses after meals. " If this treatment is strictly carried out, not more than 1 per cent. of the original cases should remain infected, and these should be cured by another course." [But we fear that it is too complicated to be strictly carried out. It is difficult enough to get patients to take a simple ten grains of quinine twice a day. Before prescribing the treatment the medical man should take a course himself, remembering that these doses are supposed to be suitable for Indians and increasing them in proportion to his weight.]

W. F.

Amies (C. Russell). **The Effect of Quinine on the Production of Gametocytes in Subtertian Malaria.**—*Bull. Inst. Med. Res. Federated Malay States.* 1930. No. 2. 10 pp. With 1 chart. [11 refs.]

It has often been suggested that though quinine destroys the trophozoites of subtertian malaria it nevertheless causes an increase in the number of crescents. Green (see this *Bulletin*, 1929, Vol. 26, p. 931) found crescents in 64 per cent. of 250 patients at the end of a week's treatment, whereas they were present in only 50 per cent. at the beginning. Ross and Thomson, on the contrary, believe that quinine does not increase the numbers of gametocytes. In order to investigate this question, the author administered 30 grains of quinine daily to 40 patients with crescents in their blood, and to a similar control group of 40 patients he gave nothing but a diaphoretic mixture. The crescents were counted daily, in thick films, by Sinton's fowl-corpuscle method. A comparison of the results showed that the production of gametocytes was not influenced by the quinine. A third series, comprising 35 patients, was given quinine after a short course of diaphoretic mixture, and " the results obtained afforded further evidence that quinine has no direct effect upon crescent production." The author believes, with Ross and Thomson, that the crescent count on any given day depends upon the number of asexual parasites present 5 to 10 days before, irrespective of any quinine given subsequently. Crescents appear on about the 5th day of the attack and reach their maximum about 5 days

later ; it therefore follows that a higher percentage will have crescents after 7 days in hospital, either with or without quinine.

W. F.

HUGHES (T. A.) & SHRIVASTAVA (D. L.). **Studies on the Enlarged Malarial Spleen. Part III. Further Observations on the Effects of Quinine and Alkalis on the Blood Picture, together with Some Remarks on the Nature of the Enlarged Malarial Spleen. Part IV. Effect of Oral Administration of Plasmoquine on the Blood Picture.** —*Indian Jl. Med. Res.* 1930. Oct. Vol. 18. No. 2. pp. 501–509. With 1 text fig. [6 refs.] ; pp. 511–515. [1 ref.] [King Edward Med. College, Lahore.]

Oral quinine causes a transient leucocytosis due to splenic contraction. This effect is enhanced by the administration of sufficient alkalis to render the urine alkaline. There is no evidence of increased cell proliferation, and the white cell count falls to about the original level after three or four days. The effect of adrenalin is increased in the same way by alkalis. Intravenous quinine appears to produce a maximal contraction of the spleen and therefore the simultaneous administration of alkalis produces no increased leucocytosis. When the spleen is fibrous the leucocytic response to both adrenalin and quinine is greatly diminished. The enlargement of the spleen in malaria is an immunity reaction due to proliferation of the reticulo-endothelial cells.

W. F.

SINTON (J. A.). **Studies in Malaria, with Special Reference to Treatment. Part XIV. The Effects of Dosage of Drugs and Duration of Treatment on the Production of Cure. Part XV. Does the Strain of Parasite Influence Cure ? Part XVI. The Relationship of Season to Cure Rate.**—*Indian Jl. Med. Res.* 1931. Jan. Vol. 18. No. 3. pp. 831–844. [47 refs.] ; pp. 845–853. [36 refs.] ; pp. 855–869. With 1 chart. [2 pages of refs.]

Part XIV. The author concludes from the reports of others, and from his own experience, that 20 grains of quinine daily is the minimal dosage during an acute attack of benign tertian, but that in the acute stages of malignant tertian and quartan malaria at least 30 grains daily " seems " to be the minimal daily dosage for routine use. [From a footnote it appears that these figures refer to the treatment of Europeans weighing about 10 stones, and not to the lighter Asiatics. In regard to permanent cure " it would seem that, within certain limits, the dosage is of less importance than the duration of the treatment " ; but one week of treatment will cure a very large percentage, and one does not seem justified in subjecting patients to the discomfort and expense of very prolonged courses.

Part XV. No certain proof has been brought forward that different strains of malaria parasites possess different degrees of virulence, or that the virulence of a strain can be changed by passage through certain species of mosquitoes or through human hosts with different degrees of susceptibility. Nevertheless the evidence, in the case of *P. vivax* at least, supports the view that malaria parasites vary in virulence.

Part XVI. There appears to be a seasonal incidence in relapses, and the evidence suggests that the relapse rates may be correlated to atmospheric temperature.

W. F.

KLIGLER (I. J.) & MER (G.). **Studies on Malaria: V. Therapeutic Value of Mixtures of Plasmochin and Quinine.**—*Riv. di Malariologia.* 1930. May–June. Vol. 9. No. 3. pp. 272–283. [8 refs.]

Five-day courses of three plasmoquine and quinine tablets were given to over 1,000 people. Each tablet contained 0·1 gram of plasmoquine and 5 grains of quinine; smaller doses were given to children. The treatment was carried out by orderlies under the supervision of the authors, who estimate that about 75 per cent. of the adult villagers received the full course. Whereas some 29 per cent. were infected with parasites before treatment, this figure was reduced to 7, at its conclusion, but about a fortnight later the percentage of infection was as high as it was before treatment, and the authors conclude that "mass treatment in an infected region at the time when infected mosquitoes are already about, is entirely ineffectual in so far as checking, or controlling the disease is concerned." (See CLEMESHA, above, p. 576.)

W. F.

SERGENT (Etienne) & CATANEI (A.). Résultats du traitement d'enfants indigènes paludéens par la plasmoquine, en Algérie. [**The Treatment of Native Children in Algeria with Plasmoquine.**]—*Arch. Inst. Pasteur d'Algérie.* 1930. Mar. Vol. 8. No. 1. pp. 71–76. With 2 diagrams. [Pasteur Inst. of Algeria, Algiers.]

Nine native children 6 to 12 years old, who were suffering from malignant tertian malaria, were given daily doses of 0·04 to 0·08 gram of plasmoquine, for one week, and for 3 days of each of the following 5 weeks. Only one child showed signs of intolerance. The treatment did not get rid of the schizonts and, in two cases, it had no action upon the gametocytes. [In view of the persistence of the gametocytes in these two cases, and the absence of toxic symptoms in all but one of the children, in spite of the large doses, one wonders if the tablets, "administered by a trustworthy agent," were always swallowed by the children.]

W. F.

AMIES (C. Russell). **The Use of Plasmoquine in Subtertian Malaria.**—*Bull. Inst. Med. Res. Federated Malay States.* 1930. No. 5. 37 pp. [24 refs.]

Preliminary observations were made by feeding anophelines daily on crescent carriers in order to determine if the patients were good infectors. Plasmoquine was then given in doses of 0·02 gram twice a day; a batch of mosquitoes was fed on each patient daily, two hours after the morning dose, and the crescents in the blood were counted at the same time. The results were as follows: patients Nos. 1 and 2 infected mosquitoes on each of three days before the administration of plasmoquine, but they did not infect any of those which bit them

two hours after the first dose, or on the next three days. Patient No. 3 infected mosquitoes on two days out of three during the preliminary period, but failed to infect two hours after the first dose of plasmoquine, and on six subsequent days. Patient No. 4 infected mosquitoes on one day out of four before plasmoquine was given, but he infected none afterwards. Patient No. 5 absconded. Patients Nos. 6 and 7 were given only one day's plasmoquine treatment. No. 6 infected mosquitoes on one day out of two before its administration, but not during five subsequent days. No. 7 infected mosquitoes on each of the two preliminary days, and also infected the batch which fed on him two hours after the first dose, but he did not infect during the next three days. *Patients Nos.* 8 *and* 9 *were given plasmoquine treatment every fourth day.* No. 8 was infective on two days out of three before treatment, but not on any of the eight days following the first dose. Patient No. 9 was the most striking case ; he infected mosquitoes on each of four days before treatment, but not on any of seven days of subsequent observation. Two control cases, Nos. 10 and 11, were treated with quinine. No. 10 was infective on one day out of two before quinine was given, but not afterwards ; No. 11, on the other hand, continued to infect mosquitoes on each of nine days while quinine was being given. The author concludes that " the results obtained indicate that a crescent carrier is rendered uninfective to mosquitoes after taking 0·04 gram of plasmoquine, and that he remains uninfective for at least three days. (See this *Bulletin*, BARBER *et al.*, 1929, Vol. 26, p. 939, and WHITMORE, *ante*, p. 107.) He finds that plasmoquine cannot prevent almost fully matured crescents from appearing in the peripheral blood, but that gametocytes in the early stages of development are destroyed. Nearly 2,500 laboratory bred *A. maculipennis* and *A. philippinensis* (*funestus*) were employed in these experiments.

W. F.

JAVETT (S. N.). **Plasmoquine in Malaria.**—*Jl. Med. Assoc. South Africa.* 1930. Nov. 22. Vol. 4. No. 22. pp. 689–691.

Dr. Javett has found plasmoquine of great use in his practice. He concludes that, though many would still prefer to use quinine in acute malaria, " Plasmoquine is an effective substitute. . . . It fills the rôle admirably when quinine is contra-indicated, e.g. idiosyncrasy, pregnancy (sometimes), blackwater fever." [Focal necrosis of the liver is often present in blackwater fever, and it is possible that the use of plasmoquine is not without danger, both in this disease and in pregnancy.]

W. F.

MANWELL (Reginald D.). **Further Studies on the Effect of Quinine and Plasmochin on Avian Malarias.**—*Amer. Jl. Trop. Med.* 1930. Nov. Vol. 10. No. 6. pp. 379-405. [23 refs.] [School of Hyg. & Public Health, Johns Hopkins Univ., Baltimore.]

Five strains of bird malaria were used in these experiments ; one of *Plasmodium elongatum*, one of *P. cathemerium*, and three of *P. praecox*. (See WAMPLER, this *Bulletin*, 1930, Vol. 27, p. 655.) Female canaries were inoculated (chiefly intramuscularly) with infected blood. One batch was treated with quinine, and one with plasmoquine ; a third batch served as a control. The drugs were administered orally, by means of a

0·5 cc. Luer syringe, with the point cut off the needle which was bent to form an oesophageal tube and covered with a little rubber tubing. Of the three species of parasites, *P. praecox* proved the most susceptible to quinine and *P. elongatum* the least. *P. elongatum*, on the contrary, was the most susceptible to plasmoquine. Sterilization was regularly produced by plasmoquine when used against the last parasite, but quinine was relatively ineffective against this species. In no case was sterilization obtained in infections of *P. cathemerium* with either drug, and in infections of *P. praecox* sterilization occurred in only one bird. Birds which had been sterilized were as susceptible as if they had never been infected, " or had recovered naturally." Plasmoquine did not seem to be nearly as much better than quinine as Roehl believed, except in the case of *P. elongatum*. *Increasing the dose to the limit of toleration did not add greatly to the efficacy of either drug.* The blood of praecox-infected birds under quinine treatment was infective for clean birds ; the blood of those under treatment with plasmoquine was not. Treatment during incubation was more effective than treatment in the acute stage. (But infection was by direct blood inoculation ; see S. P. James, above, p. 566.)

W. F.

Tskimanauri (G.). Zur Pharmakologie des Plasmochins. [**Pharmacology of Plasmochin.**]—*Nachrichten der tropischen Medizin.* Tiflis. 1930. May–June. Vol. 3. No. 1. pp. 14–22. With 2 text figs. [In Georgian script.] German summary pp. 95–96. [Pharmacol. Inst., Univ., Tiflis.]

The author carried out experiments with plasmochin using dogs and rabbits. Both chronic and acute manifestations were produced. 0·005–0·01 gm. intravenously per kilo body weight produced acute poisoning. Plasmochin proved to be a poison of the central nervous system. In acute poisoning the symptoms appeared in the following order : first paralysis of the vasomotor system with a fall in blood pressure, slowing and then complete cessation of respiration, and only at the end the heart beat stopped ; the cardiac rhythm remained undisturbed. From his observations [number not stated in summary] the author concludes that there is nothing against the therapeutic use of plasmochin in malaria, since the lethal and therapeutic doses are widely separated.

E. D. W. Greig.

De la Camara (Pedro) & Moraleda (Carmen). Observaciones sobre treinta y un casos de paludismo tratados con quiniostovarsol. [**Thirty-One Cases of Malaria treated by Quiniostovarsol.**]—*Medicina Países Cálidos.* Madrid. 1931. Mar. Vol. 4. No. 2. pp. 81–94. With 3 graphs in text. [13 refs.] English summary. [Antimalaria Inst., Navalmoral de la Mata, Cáceres, Spain.]

A careful study of 16 patients with *P. vivax* infection, 11 with *P. falciparum*, 2 with both these and 2 with post-malarial splenomegaly, is here presented. A daily enumeration of parasites per cmm. was made both as regards schizonts and gametocytes. Brief notes are given in the letterpress and the results during the treatment by the two first courses (the whole treatment consists of four courses) and during the interval after each of these are shown in tabular form. The results may be epitomized as follows :

1. *Effect on benign tertian infections.* Both schizonts and gametocytes disappeared rapidly, in two days, as with quinine. These results are compared with 40 patients treated with plasmoquine com-

pound in the Instituto Antipaludico de Navalmoral de la Mata, in whom the average time of disappearance of parasites was also two days.

2. *Effect on subtertian infections.* Schizonts disappeared in 2–5 days; in 20 patients treated with quinine and in 140 treated by plasmoquin co. the average was 3 days. Gametocytes, however, were much more slowly acted upon, the average time for their disappearance being 19 days and the extremes 10 and 30 days. The authors noted, as Raynal had previously, that the early doses increased the number of gametocytes in the peripheral blood. Compared with quinine the stovarsol compound was much less active against gametocytes, the average time of their disappearance in 20 patients treated by quinine being 10 days and in 140 patients treated by plasmoquine co. 4 days.

H. H. S.

Toscano (C.). L'insulino-terapia nella malaria. (**Insulin Therapy in Malaria.**)—*Riv. di Malariologia.* 1930. Nov.–Dec. Vol. 9. No. 6. pp. 734–740. [7 refs.] [Clin. Inst., Univ., Rome.] English summary p. 811.

Seeing that insulin is being tried in the treatment of diseases having no apparent connexion, proximate or remote, with diabetes, the turn of malaria was bound to come. The author gave it to 7 patients suffering with subtertian malaria, and found that in moderate doses, not exceeding 20 units a day, it exerted a beneficial effect on the general condition, the patients showing gain in weight, rise in the haemoglobin index and the erythrocyte count, and a hastening of convalescence, perhaps " by repair of the injuries due to the infection." It has, however, no influence at all on the course of the attack.

H. H. S.

Leger (Marcel). Le déterminisme de la guérison des paludéens. Relation possible avec le chimisme sanguin. Climato- et crénothérapie. [**Climate and Mineral Waters in the Cure of Malaria.**]—*Bull. Soc. Path. Exot.* 1930. Oct. 3. Vol. 23. No. 8. pp. 820–836. [41 refs.]

Certain mineral waters effect rapid cures. In the centra Pyrenees, Encausse-les-Thermes has been famous for centuries. How its waters cure malaria is not understood; the salts it contains are present in only infinitesimal quantities. The author suggests that the problem may be solved by a study of the blood chemistry of malaria patients or by the addition of various mineral salts to cultures of malaria parasites.

W. F.

Kligler (I. J.). **Immunity to a Reinfection with Malaria following Treatment.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1930. Nov. 25. Vol. 24. No. 3. pp. 331–336. With 2 text figs. [6 refs.] [Dept. of Hyg. & Bact., Hebrew Univ., Jerusalem.]

The author summarizes his results as follows :—

In two groups of children, 42 and 29 in number, treated with a mixture of plasmoquine-quinine which proved effective in curing any

of the three types of malaria, the incidence of the infection two weeks after the treatment was as high as or higher than that before the treatment. It appears, therefore, that children cured from malaria infection do not possess any increased immunity to reinfection. In an adult group the rate of reinfection during the same period was much lower, indicating that in such a group there is a heightened resistance to reinfection. [The numbers were too small. The adult group numbered only 54, 8 of whom were found to be infected before treatment, and 2 at a single examination 17 days after its conclusion.]

W. F.

CARTAÑÁ (Pablo). La sero-floculación palúdica (reacción de Henry). [**Henry's Reaction in Malaria.**]—*Medicina Países Cálidos.* Madrid. 1931. Mar. Vol. 4. No. 2. pp. 95–103. [19 refs.] French summary.

The first part of this paper gives an account of the basis of this reaction and of the preparation of endogenes and the reagents used. This need not be repeated (see this *Bulletin*, Vol. 26, pp. 383, 940, 941 ; and Vol. 27, pp. 211, 212). The second part details the results of the sero-flocculation test in 134 individuals. These were divided into six groups : 1. Thirty non-malarial patients, who had never suffered from the infection ; all proved negative. 2. Thirty-six with malarial attacks and parasites in the blood. Blood was taken in the apyrexial interval and all but one were positive. 3. Fourteen with palpable spleens, 11 with parasites in the peripheral blood. The reaction was positive in 12, weakly positive in one other, negative in one. 4. Those with a history of malaria in the distant past, 3–23 years or more, and showing no signs ; there were 30 of these, of whom 22 proved negative, 8 distinctly positive. 5. Those without present signs but with a more recent history of attacks, from a few months to 3 years previously. Of 31 such 20 were positive, 11 negative. 6. Seven patients undergoing malaria therapy. Four of these had just started, 3 gave a positive after the first febrile attack, the other after the second. Three others had ceased treatment after 15, 15, and 17 attacks and the test was made 3 months later ; the result was a weak positive in each case.

As regards comparisons between the three types of reaction, with metharfer, albuminate of Fe and melanin, the general conclusion is drawn that the last is more marked, occurs earlier and is more delicate and is therefore preferable ; the sera tested, however, were few, 32 in all.

H. H. S.

RADOSAVLJEVIĆ (A.). Versuche zum Nachweis von Antikörpern bei Malaria. [**Demonstration of Antibodies in Malaria.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1930. Dec. Vol. 34. No. 12. pp. 629–643. [34 refs.] [III. Med. Clinic, Univ., Belgrade.]

The author has investigated malarial blood for complement fixation, antitoxic and antiparasitic properties. The publication of the protocols of the experiments had to be omitted owing to want of space.

As regards the complement fixation reaction he employed as antigen alcoholic extracts of the whole blood containing plasmodia (*P. vivax*, *falciparum* and *malariae*) ; as control antigen an extract of the whole

blood from healthy persons was made. In inoculation malaria he finds that complement fixation occurs, but not until after the fifth rigor. In cases in which the fever ceases spontaneously the reaction continues positive for 10–30 days and then becomes negative. Successful treatment with quinine, plasmochin and stovarsol converts a positive into a negative reaction, but not sooner than in the case of spontaneous cessation, viz., in 10–30 days.

As the result of his observations he considers that blood serum, taken from malaria patients in whom the fever had ceased spontaneously, has both antitoxic and antiparasitic properties.

Although all precautions were taken in the experiments it is possible, the author concludes, that they may not be entirely free from fallacies. He trusts, however, that they will be repeated on a larger scale.

E. D. W. Greig.

Bodechtel (G.). Ein Beitrag zur Frage der Uebertragbarkeit der menschlichen Malaria auf Versuchstiere. [**Transmissibility of Human Malaria to Animals.**]—*Klin. Woch.* 1930. Oct. 25. Vol. 9. No. 43. p. 2020.

White mice were injected intraperitoneally with 1 cc. of citrated blood from cases of general paralysis which had been inoculated with benign tertian malaria. The R.E. system of the animals was in some cases blocked with citrate of iron, in others not. After 24–30 hours (2 cases, 48 hours) the thorax of the mice was opened and the heart blood withdrawn and citrated. The heart blood from 2–3 mice was injected into a patient suffering from general paralysis. 10 patients in all were inoculated. Of these 2 died before rigors occurred from sepsis occasioned by bedsores. Of the 8 remaining, 7 showed typical malarial attacks, and 1 had a febrile attack of short duration. The author considers that his experiments prove that human malaria can be "transferred" to white mice, but emphasizes the fact that it is not a "true infection." He stresses the importance of reinoculation of animal blood into man as a test of the presence of the parasites in the former; merely microscopical examination of the blood of the animal is insufficient.

E. D. W. Greig.

Ségal (J.). Inoculation à des cobayes nouveau-nés du sang d'un malade atteint de tierce bénigne. [**The Inoculation of New-Born Guinea Pigs with the Blood of a Case of Benign Tertian.**]—*Ann. Parasit. Humaine et Comparée.* 1930. Dec. 1. Vol. 8. No. 6. pp. 590–592. [5 refs.]

Yoshimo Masutaka stated that he found benign tertian rings in the corpuscles of young guineapigs, from 2 to 8 days after they had been inoculated subcutaneously with the blood of a benign tertian patient. The author's results did not confirm this; he repeated the experiments, using guineapigs on the day they were born, and injecting blood direct from a patient, without the addition of any anti-coagulant. He examined the blood daily from the second to the eighth day, but without finding parasites, even in thick films. Paralytics were inoculated with 8 cc. of blood taken from guineapigs into which 4 to 5 cc. of human benign tertian blood had been injected 8 to 12 days before: the results were again negative.

W. F.

Dalma (Giovanni) & Tuchtan (Dario). Nuovo contributo sull' uso della Novirudina nella conservazione del sangue malarico per la malarioterapia. [**The Use of Novirudin for keeping Malarial Blood.**] —*Boll. Istituto Sieroterap. Milanese.* 1930. Nov. Vol. 9. No. 11. pp. 637–641. German summary. [General Civil Hosp., Fiume.]

For preserving blood without coagulation Lusena used 1 cc. of 1–2 per cent. aqueous solution of Novirudin to every 9 cc. of blood ; the authors prefer 3 cc. of 1 per cent. solution to each 7 cc. blood and to ensure sterility they recommend taking the blood into a Behring's venule. They took specimens of malarial blood containing *P. vivax* in this way and kept some in an ice chest, some at room temperature and some at 37° C., and noted the length of time for which the parasites persisted under the different conditions. In that kept on ice parasites were visible under the microscope up to the ninth day, in that at room temperature to the fifth, in that at 37° C. for 24 hours only, the same as in citrated blood. Injecting the blood into patients suffering from nervous diseases, such as dementia praecox, they found that blood kept at room temperature was infective for 24 hours in doses of 4 cc., for 2 days with 10 cc., and 3 days with 20 cc. ; that kept on ice was infective for 4, 5, and 6 days respectively with the corresponding doses ; in one exceptional case typical malaria resulted from injection of 10 cc. after 10 days ; that at 37° C. was apparently not infective. All inoculations were made intravenously. The method should prove useful for sending malarial blood to a distance, provided it is kept on ice.

H. H. S.

Jutz (Bernhard) & Jacobi (August). Spontanruptur der Milz bei Impfmalaria. [**Spontaneous Rupture of the Spleen in Inoculation Malaria.**]—*Muench. Med. Woch.* 1931. Mar. 6. Vol. 78. No. 10. pp. 395–396. [3 refs.]

The authors observe that although traumatic rupture of the spleen occurs comparatively frequently, spontaneous rupture is extremely rare. In over 1,000 cases of inoculation malaria in Vienna and Hamburg spontaneous rupture of the spleen has been recorded only twice and one of the cases may have been traumatic. The authors' case was a tabo-paretic who was inoculated with malarial blood and 11 days later the rigors commenced. On the 12th day of the fever the patient suddenly collapsed, became comatose, pulseless and extremely pale, and died in a few minutes. The autopsy showed a greatly enlarged spleen with a rupture, 5 cm. long by 1 cm. broad, from the lower end to the hilus. There was no external trauma in this case.

E. D. W. Greig.

Sarkisian (A. B.). [**The Significance of Reticulocytes in Malaria.**]—*Trop. Med. & Veterin.* Moscow. 1930. Vol. 8. No. 1. pp. 5–10. [In Russian.]

Reticular and granular erythrocytes present in large numbers (up to 40 per cent.) in the blood of the foetus, are very scanty in normal blood (1–6 per cent.). In certain pathological conditions the proportion of these elements is considerably increased, owing to the activity of the bone-marrow. The author has compared the blood of normal and malarial subjects using vital staining methods (Brillantkresylblau, and this stain combined with Giemsa's mixture). It was found that in malarial cases—of all the three varieties and in mixed infections—

the number of reticulo-granular red cells was increased from 12 to 99 per cent. The proportion of these elements present appears to be of diagnostic value in cases where parasites are absent from the blood. During treatment the number of reticulocytes at first rises owing to increased regenerative activity on the part of the bone-marrow, and then gradually falls.

C. A. Hoare.

YORKE (Warrington) & OWEN (D. V.). *Plasmodium ovale.—Ann. Trop. Med. & Parasit.* 1930. Dec. 18. Vol. 24. No. 4. pp. 593–599. With 6 figs. [2 refs.]

A patient from Nigeria was admitted to hospital where his blood showed infection with a parasite resembling Stephens's *P. ovale* (see this *Bulletin*, 1923, Vol. 20, p. 296). The parasite was indistinguishable morphologically from *P. malariae*, but its cycle of schizogony was completed in 48 hours. The infected red cells were pale, fragile, frequently oval, usually with an irregular ragged outline, and heavily stippled. Though the strain was passed through five tabetic patients, its characters remained constant. Whether these " are sufficient to justify the erection of a new species, we do not know." (See JAMES on Ziemann's stippling, this *Bulletin*, 1930, Vol. 27, p. 664.)

W. F.

SCHNEIDER (Horst). Arbeitsmethoden italienischer Malariastationen auf der Insel Sardinien. [**Work of the Italian Malaria Stations in Sardinia.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1931. Jan. Vol. 35. No. 1. pp. 36–48. With 4 text figs. [10 refs.]

In the parts served by the stations malaria is endemic. The figures for the districts are :—

	Spleen Index.			Parasite Index.		
	1927.	1928.	1929.	1927.	1928.	1929.
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Siniscola	53·2	35·0	39·3	10·3	10·3	14·0
Posada	100·0	97·0	97·2	24·0	32·5	45·2
Lodé	86·9	90·0	93·0	30·0	29·0	15·4
Torpé	84·6	92·0	92·0	24·8	12·6	36·5

The antimalarial measures in these places consisted of quinine distribution to the inhabitants and destruction of larvae by Paris green. Local conditions determined which measure should be applied. Thus in Posada antilarval measures were not practicable on account of the amount of marshy land ; so quininization was exclusively employed. In discussing the plan of work the author notes that quinine alone has little action on the gametocytes of the parasites, whilst plasmoquine causes them to disappear in a few days. He points out that areas in which the splenic index is from 70 to 100 per cent. are very slightly affected by antimalarial measures, whilst districts in which it is below 70 per cent. are much more amenable.

E. D. W. Greig.

NEVEU (Raymond). L'assainissement des Marais-Pontins. [**The Reclamation of the Pontine Marshes.**]—*Ann. d' Hyg. Pub., Indust. et Sociale.* 1931. Feb. Vol. 9. No. 2. pp. 81–86. [2 refs.]

The marshes, situated between the Apennines and the sea, are soaked with the water which comes down from the mountains in streams blocked by rank semi-tropical vegetation. The engineers have almost completed the construction of a huge dam at the foot of the mountains which directs the water into a great canal, 40 kilometres long, leading to the sea. The plain has been cleared of undergrowth, new roads have been made, and new agricultural colonies have been founded, each with its church, hospital and social club. At Quadrato, an industrial centre has arisen, where the machinery employed in this vast undertaking is repaired, and where windows, doors and furniture for the settlers' new houses are manufactured. Experimental gardens are working under government control to determine the crops best suited for the different parts of the country side, for the soil is not the same over the whole area. All these measures are included under the heading of " Grand Bonification," for which the Government pays 75 per cent. of the cost, the rest being borne by the local authorities and the owners of the land. The author then proceeds to describe the lesser bonification, which consists of anti-anopheline measures, and house-screening combined with a search for all sufferers from malaria and their subsequent treatment. A government quinine factory at Turin turns out 6,000 kilos annually, which is distributed among the inhabitants, who are urged to take prophylactic quinine. (*Ante*, THOMSON, p. 123 ; HACKETT, p. 124.)

W. F.

MISSIROLI (A.). Le grandi bonifiche nei riguardi della biologia e dell' igiene. [**Large-Scale Bonification with Regard to Biology and Hygiene.**]—Supplement to *Riv. di Malariologia.* 1930. Vol. 9. 54 pp. With 14 text figs. & 3 folding plates. [4 pages of refs.]

The author defines " bonifica " to denote hydraulic improvements of soil on which men are working to ensure health from the malarial aspect while maintaining the use of the land. A considerable portion of the article is historical in character, recounting drainage measures during the days of the Roman Empire, in mediaeval times, during the 16th–18th centuries, and finally in the last fifty years. He describes the conditions in Ostia, Isola Sacra (Fiumicino) and Maccarese, the system being that of mechanical drainage—interlacing canals for surface waters, others for deeper water, means of raising the low-lying water and for discharging it into the sea. Pictures are reproduced showing the state of water-logging of the Agro Romano after building the canal before and after the institution of an electric pump for withdrawing water, and an accompanying chart shows the growth of the population and rapid reduction of malarial incidence between 1907 and 1928. Fiumicino and Maccarese are similarly described. Briefly, some degree of bonification of the delta was carried out in 1889 ; quinine widely used reduced the mortality from malaria, but the incidence remained very high. Later anti-mosquito measures, use of larvicides as Paris green, introduction of Gambusia, improvement of drainage and so on were adopted, and in 1919 at Ostia, 1925 at Fiumicino, and 1926 at Maccarese a rapid fall in the number of cases began. Now the official

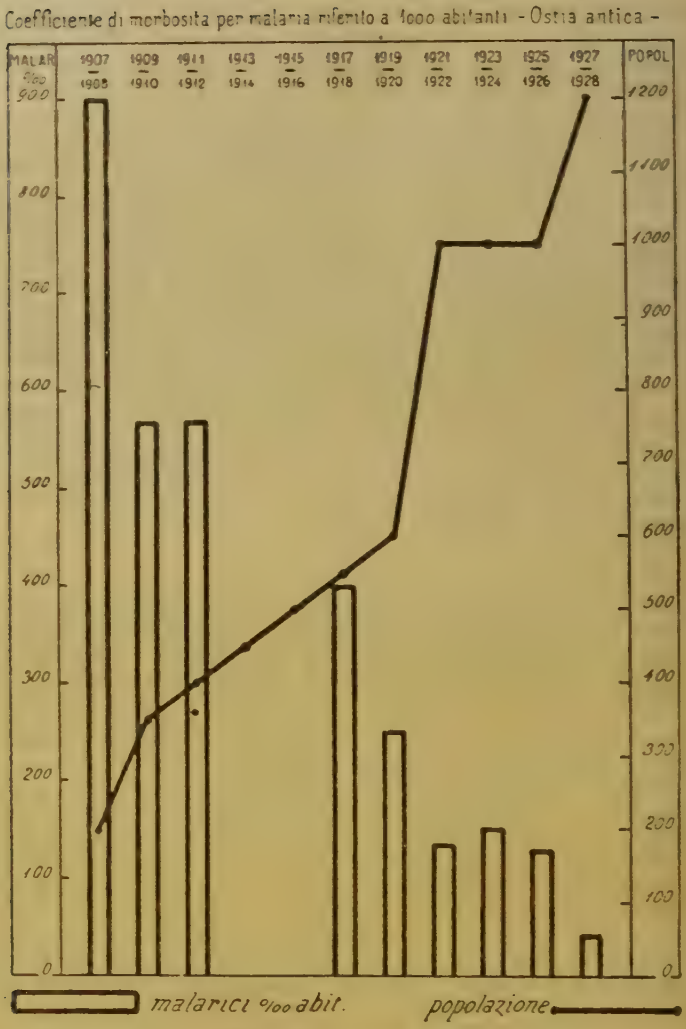

Chart showing the growth of population and reduction in malaria incidence at Ostia antica between 1907–8 and 1927–8.

[Block kindly supplied by the *Rivista di Malariologia*.]

returns give the incidence as 0·4 per cent. at Ostia on the sea and the surrounding area, 2·3 per cent. at Ostia antica and at Fiumicino almost the same (2·19); at Maccarese the figure is 12 per cent., but the measures were adopted later there and full advantage is not yet taken of them, such as screening of houses. The article contains the usual section on the biology of *A. maculipennis* without which no recent author appears to regard his contribution as complete. The whole forms a very interesting account from both the historical and epidemiological aspects.

H. H. S.

Missiroli (A.). La prevenzione della malaria nel campo pratico. Terza relazione (1928–1929). (**Prevention of Malaria in Practice. 3rd Report.**)—*Riv. di Malariologia.* 1930. Nov.–Dec. Vol. 9. No. 6. pp. 667–705. With 8 plates. [21 refs.] English summary p. 810.

This is in the main a continuation of the author's previous report (see this *Bulletin*, Vol. 26, p. 34) giving an account of the further results of the same methods, chiefly the extensive use of larvicides, in particular Paris green. The article includes tables giving the results of examination of the inhabitants in more than a score of districts to determine the splenic index, and the parasitic index, the results of the distribution of quinine and the cost of the antilarval campaign. It is not possible to analyse all the detail presented and those interested should consult the original; suffice it to say that the author finds that his former conclusions are confirmed.

H. H. S.

Watson (Malcolm). **Anti-Malarial Work.**—*Bull. Rubber Growers' Assoc.* 1930. Nov. Vol. 12. No. 11. pp. 605–606.

Sir Malcolm Watson suggests as an emergency measure, during the present crisis in rubber finance, that oil-spraying on healthy rubber estates should be carried out once a fortnight, instead of once a week, from September until the end of the rains in the middle of January; and once every 12 days during the drier part of the year, when the springs are at their purest and *A. maculatus* is breeding rapidly. He also suggests an excavation at the head of every water-containing ravine, into which a sack of bark-scrap, tapioca, or other decomposable matter should be put, with the object of increasing the nitrogen dissolved in the water, and so rendering it less suitable for breeding *A. maculatus*.

W. F.

Wallace (R. B.). **Cessation of Oiling in a Malarious Area during a Certain Season of the Year.**—*Malayan Med. Jl.* 1930. Dec. Vol. 5. No. 4. pp. 117–125. With 1 chart in text. [1 ref.]

There appears to be a definite malaria season, in Kedah, which lasts from March to September. On certain divisions of the rubber estates, of which the author is in charge, anti-larval oiling was suspended during the off-season, from October 14 to December 31. This was

followed by an increase in the number of breeding places of *A. maculatus*, and also in the number of adults, but the malaria rate declined, as it usually declines at this time of the year. The author concludes that larvicidal measures are unnecessary during this off-season; probably because *A. maculatus* does not cause infection at this time of the year. [See also effects of mosquito prevalence during non-malarious winter months in eastern Bengal, and in rice fields of Assam—League of Nations' report, above, p. 571.]

W. F.

GATER (B. A. R.). **The Asthenobiosis Theory and Larval Surveys.**—*Malayan Med. Jl.* 1930. Dec. Vol. 5. No. 4. pp. 126–128. With 1 text fig.

ROUBAUD'S theory of asthenobiosis is to the effect that hibernation and aestivation are due to uraemic intoxication which necessitates a period of reduced metabolism in order to get rid of the waste products. In several districts he found swarms of *A. maculipennis* larvae in small collections of water, but very few adults in the houses. He concluded that the larvae poisoned themselves by constantly ingesting their own excreta, and that the anopheline density of an area should be estimated by adult surveys. The author thinks it possible that too much reliance has been placed upon larval surveys in Malaya, where he has found the adult density of *A. aconitus* at its maximum in December, when there are few larvae; and the larvae most plentiful in February, when the number of adults is declining. He found in the case of *A. maculatus*, too, that when there were few adults, there were numerous larvae in small collections of water; as the adults became numerous, the larvae decreased and were found only in drains, wells, and silt-pits. On Dr. WALLACE'S estates, too, the maximum number of larvae was found in December when there are few adults; the maximum number of adults was caught in July. This evidence of inverse density of larvae and adults in Malaya demonstrates the necessity of making adult catches in malaria surveys.

W. F.

CEYLON. **Report of the Superintendent, Anti-Malaria Campaigns, for the Year 1929** [RUSTOMJEE (K. J.)].—*Ceylon Administration Rep. Director Med. & San. Services, 1929.* Appendix. pp. C 66–C 73.

This is an account of the antimalaria measures adopted and the results obtained in several centres. The methods employed were oiling (1 part kerosene, 4 parts fuel oil), Paris green, quinine distribution, and stocking wells with larvivorous fish. Paris green was mixed in the proportion of 2 per cent. by weight with coir dust, but this proved unsatisfactory and a 1 per cent. mixture with slaked lime is being tried. Italian spraying machines were found most satisfactory. In the Kurunegala centre, where work was begun in 1927, the spleen rates were 37 in 1927, 32 in 1928, 18 in 1929. In other centres, such as Chilaw, where the inhabitants object to having their wells treated, the spleen rate is as high as it was in 1927. Experiments with Esanophile are in progress.

W. F.

Ottolenghi (Donato). La lotta contro la malaria nelle bonifiche. [**Bonification in combating Malaria.**]—Reprinted from *L'Italia Agricola.* 1930. July–Aug. No. 7–8. 24 pp. With 8 text figs.

A good article for readers of Italian.

H. H. S.

Indian Medical Gazette. 1931. Jan. Vol. 66. No. 1. p. 58.—**Tests for Stock Solutions of Quinine and Potassium Iodide.**

The apparatus described by Megaw and Hawley for checking stock mixtures containing quinine or pot. iodide can now be obtained from Messrs. Boots.

W. F.

Di Natale (Antonio). La reazione di Wassermann e le reazioni di flocculazione nella malaria. (Wassermann and Flocculation] Tests in Malaria.)—*Riv. di Malariologia.* 1930. Nov.–Dec. Vol. 9. No. 6. pp. 741–753. [43 refs.] English summary p. 811. [Roy. Inst. of Clin. Med., Rome.]

Hemenway (Ruth V.). One Hundred Malarial Cases. A Summary.—*China Med. Jl.* 1930. Nov. Vol. 44. No. 11. pp. 1118–1123.

Henry (A. F. X.). Séroflocculation palustre.—*Arch. Ital. Sci. Med. Colon.* 1930. Dec. 1. Vol. 11. No. 12. pp. 723–743. [22 refs.] English summary (7 lines).

Knowles (R.), White (R. Senior) & Gupta (Das). Studies in the Parasitology of Malaria.—*China Med. Jl.* 1931. Apr. Vol. 45. No. 4. pp. 332–347. [1 ref.]

Le Bourdellès (B.) & Liégeois (R.). La sero-floculation du paludisme (réaction de Henry) ; ses résultats cliniques.—*Arch. Ital. Sci. Med. Colon.* 1930. Dec. 1. Vol. 11. No. 12. pp. 744–753. [33 refs.] English summary.

Lorando (W. J.). Sur quelques facteurs dans la fièvre pernicieuse palustre.—*Bull. Soc. Path. Exot.* 1930. Nov. 12. Vol. 23. No. 9. pp. 927–932. [20 refs.]

de Miglio (Ugo). La campagna antimalarica durante l'anno 1929 nel territorio di Crotone (Catanzaro). (Antimalarial Campaign in the Territory of Crotone (Province of Catanzaro) during 1929).—*Riv. di Malariologia.* 1930. May–June. Vol. 9. No. 3. pp. 303–312. With 1 fig. & 1 map. English summary (9 lines) p. 360.

Nocht (B.) & Mühlens (P.). La cura della malaria con la plasmochina. (The Use of Plasmoquin in the Treatment of Malaria.)—*Riv. di Malariologia.* 1930. May-June. Vol. 9. No. 3. pp. 284–302. English summary (8 lines) p. 360.

Ronnefeldt (F.). Zur Plasmochinprophylaxe.—*Muench. Med. Woch.* 1931. Feb. 6. Vol. 78. No. 6. pp. 240–241. [St. Timothy's Hosp., American Mission, Cape Mount, Liberia, W. Africa.]

Sarkar (Sarasi Lal). Some Peculiarities in the Malarial Temperature Charts of Chittagong Hill Tracts.—*Indian Jl. Med. Res.* 1930. Oct. Vol. 18. No. 2. pp. 367–375. With 1 curve in text & 7 charts on 2 plates. [7 refs.]

Scharff (J. W.). A Tour in Malariology.—*Malayan Med. Jl.* 1930. Dec. Vol. 5. No. 4. pp. 140–145. With 8 figs. on 2 plates.

Erratum.

Vol. 28, No. 2, p. 129. Jackson's summary, line 1, *for* Forty-seven children *read* Four hundred and seventy-one children.

REVIEWS AND NOTICES.

KNOWLES (R.) [I.M.S., Professor of Protozoology, Calcutta School of Tropical Medicine & Hygiene] & WHITE (R. Senior) [F.R.S.E., Malariologist, Bengal-Nagpur Railway] assisted by Assistant Surgeon B.M. Das GUPTA. **Studies in the Parasitology of Malaria.** —*Indian Med. Res. Memoirs. Supplementary Series to Indian Jl. Med. Res.* 1930. Dec. Memoir No. 18. pp. xii+436. With 12 maps, 59 charts, 5 text charts & 1 coloured plate. [Rs. 14-12-0 or 19s. 8d.]

The authors have attempted with great courage and enormous energy to map out the distribution of the three species of malaria parasites throughout the world. This entailed a search of no less than 35 journals for the years 1900–28 and the summarizing of about 600 papers. The result is a great success, so far as success is possible in such a task, and tropical medicine owes them a debt of gratitude for their industry. The work was arduous, and they complain that though malaria has been extensively investigated in the French and Dutch colonies, with publication of the results in well-known journals, information about the disease in the British Empire " is scanty in the extreme." In this connexion they appear to have overlooked the very excellent annual reports published by the governments of our colonies and protectorates which would surely have saved them much labour ; for example, they state that information about malaria in East Africa is surprisingly scanty, and all they have to say about Uganda is taken from a report made by CASTELLANI and LOW in 1904, yet the annual reports supply the diagnosis of very large numbers of cases ; in the last one from Uganda, the figures were : subtertian 7,048, benign tertian 1,920, quartan 57. Although they were working with statistical data collected from many sources of different value, their results are probably accurate enough to show fairly closely the relative prevalence of each species of malaria in the different countries of the world. For example, they laboriously collected seventeen sets of figures for the Malay States, totalling 1,062 cases ; 60·5 per cent. of these were subtertian, 32·4 were benign tertian, and 7·1 were quartan. Now the figures in the annual report of the Protectorate for the year 1929 were in almost exactly the same proportion, namely 15,775 subtertian, 7,850 benign tertian, and 1,019 quartan.

The authors consider it as grave an error to treat a case of malaria without determining the species of parasite, as to treat a case of dysentery without determining whether it is due to amoebae or to bacilli ; " it is the realisation of this fact," they say, " which has led to the preparation of the present Memoir." In order to test the practicability of correctly diagnosing the species in routine practice, they gave blood-films to a number of medical men to examine in turn. These men were approaching the end of their six months' D.T.M. course, and had had no end of blood-films to examine during that time, yet there was 59 per cent. of error when they saw only one parasite, and 20 per cent. when they each spent 5 minutes examining the whole of each slide. It is fortunate that quinine is a specific for all three forms of malaria parasite (while emetine cures only one form of dysentery), for it is regrettably true that most cases of malaria have to be treated without any blood examination at all. It would be interesting to know the percentage of error when thick films are examined by experts. Colonel Knowles and his colleagues evidently accept ACTON'S finding [not generally confirmed] that quinidine and cinchonidine are of greater value than quinine in the treatment of benign tertian, for they suggest that in places such as Ceylon where most of the malaria is of that type, " the medical authorities might almost strike quinine off their indent for drugs " and use the cheaper cinchona febrifuge instead, but that where the seasonal distribution of the species of parasite is unknown, such economies cannot be thought of.

The results of their researches have led the authors to formulate a most interesting hypothesis of the evolution of the parasites of malaria, which—assuming that they were primarily parasites of mosquitoes only—are probably older than mammals. They believe that *P. malariae* is the oldest of the three types, and they argue from its special association with primitive tribes and its patchy distribution that its present foci are the residuum of a much wider distribution from which it is gradually disappearing. It is the least severe of the three types and this, they suggest, is because it has been the longest in association with man. According to their investigations it appears to have spread from three foci, and " it is possible that the three main foci of *P. malariae* coincide with the supposed sites of origin of the three sub-species of *Homo sapiens* (*caucasiensis*, *mongolensis* and *ethiopicus*)." One of these foci they place at the corner of north-eastern India, where it meets the boundaries of Burma and China. The second, they consider, was a vast patch extending across the whole of Africa, Madagascar, Ceylon and South India, which were united during the Eocene in the hypothetical Lemuria, and cut off from Northern India by the sea which then filled the Indo-Gangetic plain. This patch was disrupted by the breaking up of the prehistoric continent, and the separation of Madagascar from the mainland, but, in what is left of it, with the exception of East Africa, quartan still flourishes ; namely in West Africa, Madagascar, Ceylon and South India ; shrinking lakes and a drying climate have driven it from East Africa.* The third focus they put in the Caucasus. *P. vivax*, they consider, was probably the second species to evolve, on the ground that it is more adapted to man than *P. falciparum* and causes less clinical disturbance. " *P. falciparum* we regard as the species (if indeed it be not a separate genus) of most recent evolution." Its maximum output of gametocytes frequently fails to coincide with the most favourable season for transmission, and in this connexion they prophesy, most alarmingly, that " should it ever reach a relative output equal to that of *P. malariae*, coinciding with the commencement of the most favourable season for transmission it might well exterminate man in the tropics." Though it is essentially a book of reference, it is very far from being dull.

William Fletcher.

SIMMONS (James Stevens), ST. JOHN (Joe H.) & REYNOLDS (Francois H. K.). **Experimental Studies of Dengue.**—*Philippine Jl. Sci.* 1931. Jan.–Feb. Vol. 44. Nos. 1–2. pp. 1–251. With 67 text figs. & 3 plates. [125 refs.] [Bureau of Science, Manila, P.I.]

These studies began in the Philippine Islands in 1928, and the chief problems dealt with were : (*a*) the epidemiology of dengue ; (*b*) the nature of the virus ; (*c*) the various insect vectors of the disease ; (*d*) the transmission of dengue from infected to normal insects ; (*e*) search for a suitable susceptible laboratory animal ; (*f*) serological diagnostic methods ; (*g*) the therapeutic value of immune sera ; and (*h*) the use of a prophylactic vaccine.

The epidemiology was limited to the military personnel. The annual admission rate per 1,000 white troops in the Philippines was 177. A study of the morbidity figures for dengue in the whole U.S.A. Army showed that 97 per cent. of the total dengue cases occurred amongst troops serving in the Philippines, especially in the low lands in and around Manila. In areas where screening was practised the incidence of dengue was reduced along with that of malaria. Both *Aedes aegypti* and *A. albopictus* were proved to be vectors of the disease when fed on dengue patients during the first two days of illness, provided a period of twelve days was allowed for the virus to incubate in the mosquito. These mosquitoes remained infective for 70 days. A single insect was found sufficient to infect. *Culex quin-*

* According to Colonel JAMES quartan malaria has been by no means banished from East Africa.

quefasciatus was not found to transmit the disease, except by direct mechanical transference. Dengue virus from crushed infected mosquitoes did not cause infection when rubbed on intact or excoriated skin. There was no evidence of hereditary transmission of dengue through egg to offspring, but the experiments to test the possible transmission of the virus to larvae in their breeding grounds were inconclusive. Charts were prepared showing how mosquito proliferation and the occurrence of dengue coincided with the rainy season. Natives were shown to possess an acquired but not a racial immunity.

Attempts to demonstrate the virus of dengue both in the blood of dengue patients and in the bodies of infected *Aedes aegypti* by microscopical examination (dark ground illumination and after staining) failed. Carefully planned cultural experiments carried out with many different types of media—including Noguchi's leptospira ; N N N ; Locke's egg serum ; Galloway's spirochaete ; hydrocele fluid ; heart, spleen, brain, bone marrow, lymph gland, banana, and even mosquito broth—did not demonstrate the presence or growth of dengue virus *in vitro*. The virus was found to pass through a Berkefeld " V " filter.

A clinical study of experimentally produced dengue showed the average incubation period to be 5½ days ; duration of fever to be 5 days ; that 39 per cent. developed a primary and 69 per cent. a secondary rash ; that every case presented a leucopenia with shift of Arneth index to the left. The type of infection was as follows : mild in 13·6, average in 70·4, and severe in 16 per cent. Passage through man and mosquitoes did not appear to alter the virulence of the infection, which probably depended on individual susceptibility. A hundred per cent. of the volunteers infected with dengue were immune to re-infection during the following twelve months, but no specific antibodies were detected.

Vaccines were made from filtrates of suspensions both of dengue-infected mosquitoes and of the dried blood of dengue patients, but were of no prophylactic value.

Many animals were tested regarding their susceptibility to infection with dengue. The disease was transmitted to Macacus monkeys, *fuscatus* and *philippinensis*, and was re-transmitted from them to man. Unfortunately for diagnostic purposes, the monkeys showed no pyrexial or leucocytic evidence of disease. Guineapigs, rabbits, mice, chickens and lizards proved non-susceptible.

These researches were carefully carried out and for the most part add valuable confirmation to the findings of earlier authors, including Ashburn, Craig, Siler, Hall, Hitchens and Cleland.

Harold E. Whittingham.

The Veterinary Bulletin. 1931. April. Vol. 1. No. 1. pp. 1–96. —Published by the Imperial Bureau of Animal Health, Weybridge, Surrey, England. [Price 7s. 6d. net. Annual subscription £1.]

The first number of the new Bulletin published by the Imperial Bureau of Animal Health is naturally of interest to this Bureau which was from 1912 to 1930 responsible for its precursor. It consists of 88 pages of text containing summaries of 168 papers, and has a full Contents under 13 headings. In the present year four numbers will be issued ; from 1932 onwards 12, making a volume of about 600 pages.

The number is well turned out and the proof-reading good. The reviewer suggests, however, that if the Editor desires contented readers, he should take the opportunity of the next volume to shorten the line of print.

A. G. B.